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# THE CONDOR

A Magazine of Western  
Ornithology



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# THE CONDOR

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# THE CONDOR

VOLUME 48

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## THE PEREGRINE POPULATION OF WESTERN NORTH AMERICA

By RICHARD M. BOND

The breeding population of the Peregrine Falcon (Duck Hawk, *Falco peregrinus anatum*) in eastern North America has been the subject of a highly instructive paper by Hickey (1942). He was somewhat dissatisfied with his results because they were so incomplete. Nevertheless, his study is considerably more detailed than I have been able to make this one, partly because of a longer list of published notes and papers on eastern eyries and partly because he had invaluable assistance in the field from a number of active and enthusiastic students of the species.

Hickey was able to make a number of important generalizations from his data, and many of these hold for the western birds quite as well as for those of the east. It seems best, therefore, to present my material more or less in the form of a supplement to Hickey's paper rather than to repeat much that is already fully available.

This report is based partly on the literature (87 eyries) and partly on my own observations, but much more on the generous assistance of about fifty other observers. Of these, I am especially indebted to the following: Nelson Carpenter, H. W. Carriger, I. McT. Cowan, John E. Cushing, Jr., Herbert De Tracy, James B. Dixon, J. Elton Green, Ed N. Harrison, A. P. Marshall, Donald D. McLean, O. J. Murie, the late O. P. Silliman, Lewis W. Walker, and L. Zuk. I am also grateful to Philip F. Allan, J. J. Hickey, A. H. Miller, F. A. Pitelka, A. J. van Rossem, the late George Willett, and others for help with the literature, for proofreading all or part of this paper, and for valuable suggestions and advice, and to Homer F. Snow for permission to use one of his photographs (fig. 21).

In order not to overlap the territory covered by Hickey, I have limited this paper to Alaska, Yukon Territory, British Columbia and those parts of the United States and Mexico west of the continental divide.

### BREEDING DISTRIBUTION

The present known breeding range of *Falco peregrinus* in western North America extends from the Rockies west through the Aleutians and from the coast of Alaska east of Point Barrow on the Arctic Ocean at 70° North Latitude (Bent, 1938; and skin in L. B. Bishop collection), south at least to Cape San Lucas in Baja California and Isabel Island off the coast of Nayarit (three pairs, April, 1940, reported orally by Ed N. Harrison). This range extends considerably north of that given in the 1931 A.O.U. Checklist ("Norton Sound") and also considerably farther south ("central Lower California"). The north-south range covers almost 50° of latitude and is at present all ascribed to the subspecies *anatum*.

Curiously, I have found no published reports of the Peregrine on Guadalupe Island, nor has L. W. Walker, in the course of half a dozen visits, ever seen one there (oral

communication). The island seems ideally suited to Peregrines, and although about 135 miles from the mainland of Baja California, it is well within flight range of this bird.

The Peale Falcon (*F. p. pealei*) presents a problem of breeding distribution that needs elucidation. The A.O.U. Check-list (1931:75) gives the breeding range as the "Queen Charlotte (?), Aleutian and Commander islands." Dawson (1908), using sight



Fig. 21. Peregrine protesting at nest in northern California. Photograph by Homer F. Snow.

records, extended the range of this race down the coast as far as the Carrol Islets off western Washington, although he (Dawson and Bowles, 1909) calls birds on the San Juan Islands *anatum*; and Stanley G. Jewett tells me he would not be surprised to find *pealei* breeding as far south as the coast of northern Oregon since his collection contains a number of immature Peale Falcons from there, all taken somewhat after the breeding season, however. The longest stretch of shoreline unsuitable for breeding Peregrines seems to be that from north of Grays Harbor, Washington, to Tillamook Head, Oregon, a distance of approximately 100 miles; I should first look there for a possible break between the subspecies.

How far inland the Peale Falcon breeds is also unknown, although according to J. Dan Webster (oral communication) in the Sitka region of Alaska the birds nest only on the outer capes and islands and apparently never on the cliffs near the heads of the

sounds or fjords. It is also unknown how far the range of the subspecies extends up the Bering Sea coast of Alaska.

As Hickey found, the same site was often referred to by my various informants by different names. In some instances this difficulty was solved by having the site marked on U.S.G.S. quadrangle maps or by other means. A few uncertain records were thus eliminated; I may have failed to list an eyrie rather than risk reporting it twice. A feature by which my records seem to differ from those of Hickey is that a large majority of mine are based on a single visit by an observer and their subsequent history and present status are entirely unknown. Some of these western records are very old, but I have included them with the more recent records.

Table 1

Number of Reported Sites	
Alaska	78
Canada	67
United States	136
Mexico	47
Total	328

Of the sites tabulated, a third, or 109, are in the range assigned to *pealei* in the 1931 A.O.U. Check-list. The fact that the total is smaller than that given by Hickey (408) for eastern North America is almost certainly due to the less intensive field work in the territory covered by my report, rather than to any actual differences in the populations.

#### FACTORS AFFECTING BREEDING, DISTRIBUTION, AND DENSITY

1. *Cliffs*.—Hickey's conclusion that cliffs are the all-important factor in determining the distribution of breeding Peregrines, while largely true, seems to be an over-simplification when one tries to apply it in the west. There are literally hundreds of cliffs in the west that would be "second class" or better in the east, but that have no Peregrines on them and, so far as is known, never have had. There are other areas, more subject to human disturbance, where "second" and even "third" class cliffs are regularly occupied. A rough indication of the apparent areas of "high" (less than 2,000 square miles to the pair) population are shown on the map (fig. 22), although parts of the "low" (more than 20,000 square miles to the pair) area may really only be unexplored. Even in the area of "dense" population, there are cliffs that belie Hickey's generalization, as for example, the great cliff near Santa Barbara, California, where W. L. Dawson collected for a number of years, but which despite its "first class" appearance has been uninhabited since 1927, although second and third class cliffs within sight of it have been occupied off and on since that date. Some of the most magnificent cliffs in the west are in the Sierra Nevada and Cascade Range, mostly near or above timberline (6,000 to 11,000 feet), and so far as I know, very few are reported to be occupied by breeding Peregrines. Food in such areas is not over-abundant, but *Leucostictes* (*Leucosticte* sp.), Clark Nutcrackers (*Nucifraga columbiana*) and other high-country birds should be sufficient for at least an occasional pair. Also, so far as I can discover, the tremendous cliffs of the Grand Canyon have not been reported to harbor any eyries, although they have not been fully explored by any means and an adult carrying prey was seen on June 22, 1932, by Randolph Jenks in Havasu Canyon (letter from A. R. Phillips to Hickey).

Hickey (page 196) defines "first-class Peregrine cliffs" as being "extremely high, often rather long, usually overlooking water, and generally dominating the surrounding

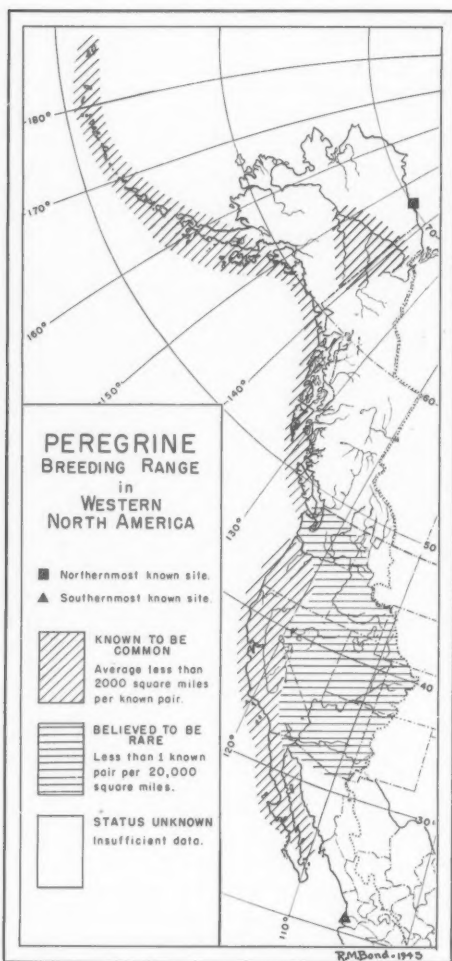


Fig. 22. Breeding distribution of Peregrines in western North America.

countryside. These so attract this species in the breeding season that Peregrines will apparently occupy them *no matter how many 'nests' are broken up or adult birds destroyed.*" "Second-class Peregrine cliffs differ from the above merely in their dimensions. Here, the birds can withstand considerable molestation. Death of one bird does not necessarily cause the abandonment of the eyries, but death of both adults may leave the cliff without birds for an indefinite time." "Third-class Peregrine cliffs are small, not very high, although they may be far up a long slope, and they may or may not

overlook water. They may be regarded as the marginal niches in Peregrine ecology."

In the west, a fourth type of natural site must be recognized, namely, *small islands*. These may not have any cliffs at all (fig. 23) or very low ones, and yet be as "magnetic" as first- or second-class cliffs. These are usually in the sea, although they are also found in large lakes. This type of site is especially important to *pealei* (McCabe and McCabe, 1937; Green, 1916), although by no means restricted to this subspecies. So far as I know, such islands are always fairly small, and they are without mammalian predators and without ground squirrels or rats.

As to *man-made structures*, no western Peregrines are known to nest on buildings, but the use of a barrel-top in a marsh reported by de Groot (1927) seems to be authentic,



Fig. 23. Eyrie at top of talus slope on a small island in Mexico. The nest can be reached easily without climbing. Photograph by Lewis W. Walker.

and there are records of nests on an abandoned oil derrick (personal observation) and on a platform of a power pole (D. D. McLean, oral communication).

2. *Egg site*.—The requirements outlined by Hickey are perhaps more frequently met in the west by the appropriation of the nest of a Raven (*Corvus corax*) (fig. 24), Red-tail (*Buteo jamaicensis*) or other species that builds nests of sticks, than in the east where such birds are rarer. Several Peregrine sites in the west are known where the cliff would be entirely uninhabitable except for the architectural ability of some other species. At least in the southern part of its range, *pealei* seems to prefer to nest under the roots of a spruce tree at the top of a low cliff (McCabe and McCabe, 1937; Green, 1916).

3. *Territorial competition*.—The most closely placed mainland eyries of *anatum* I have seen are two found in 1936 in San Benito County, California, where a deep canyon cuts through a high ridge. One pair nested in a pothole near the top of a high, south-facing cliff and the other pair on an east-facing ledge on a cliff on the main ridge about a mile south of the first pair. I am not sure that the nest sites were in view of each other, but if not, members of the second pair could certainly be seen by the first when they

were in the air only 20 or 30 feet in front of the nesting ledge. Moreover, they spent much of their time on a cliff directly across the canyon from the first pair and only about 600 yards from the nest of the latter. I never saw members of either of these two pairs attack the other. However, the nest of the second pair was once approached by a strange young female that was about half molted into adult plumage, and the resident male drove her off, both birds going through exactly the actions described by Hickey (1942:181) even to the direction taken by the female in leaving!

Although, as Hickey (1942:180) states, "The entire foraging area is apparently not defended," I suspect that the birds do defend some sort of a territory, else it would



Fig. 24. Young Peregrines in a stick nest built by Ravens. Photograph by Lewis W. Walker.

be difficult to account for the fact that pairs are well spaced even on apparently ideal cliffs with innumerable suitable potholes and enormous supplies of food.

An interesting instance of territorial competition is reported by L. W. Walker (letter). In 1939 and 1940 two nests were found within 1000 feet of each other on a Mexican island, but only one male was in evidence. He screamed at a disturbance at either eyrie and was not threatened by either female as he passed from one to the other. The females fought each other vigorously whenever one came close to the nest of the other.

L. Zuk (letter, 1946) found that in southern California the adults of all the pairs he observed remained attached to the nest site through summer, fall and as late in the winter as his observations went. They were present on the cliff at dawn on practically every visit, and some pairs spent several hours there later in the day. The proprietary



attitude of the birds remained strong well after the nesting season. The female of one pair stooped at Zuk on July 30 when he visited the cliff, and the female of another pair struck at a trained Peregrine that was placed below the nesting cliff on December 31. Both sexes protested vocally at his visits, no matter what the date.

Peale Falcons appear to be less solitary. Brooks (1921:154) states that "sometimes the yelping of three different broods of young birds could be heard from one stand." S. J. Darcus, in a letter (1935) to W. E. Griffie, says of the birds on the island of which Brooks was writing: "There were two nests within 100 yards of my camp on either side."

4. *Competition with other species.*—I have seen nesting Peregrines strike Turkey Vultures (*Cathartes aura*), Horned Owls (*Bubo virginianus*) (Dixon and Bond, 1937) and strike at Golden Eagles (*Aquila chrysaetos*), Red-tails, Ravens, Barn Owls (*Tyto alba*), Ferruginous Rough-legs (*Buteo regalis*), and Cooper Hawks (*Accipiter cooperii*). Osgood (1901:43) tells of a pair that "had daily altercations with a bald eagle [*Haliaeetus leucocephalus*]." But obviously the falcons were affecting the other birds—not vice versa except in the case reported by Dixon (1937) in which Golden Eagles drove off the Peregrines. It is my impression that most of this activity occurs when the Peregrines are disturbed by man or some other "foreign" agency, and that individual Peregrines vary greatly in their touchiness as regards other species. As pointed out above, some of the other predatory birds furnish nesting sites for the falcons.

The one species the relationship of which with the Peregrine I believe is not settled is the Prairie Falcon (*Falco mexicanus*). The two species may nest peaceably only a few hundred feet apart. The Prairie Falcon often nests in places that would never be used by a Peregrine, and competition for food can not be very serious (Bond, 1936a). But the Prairie Falcon is the one bird of the western United States that is an equal for the Peregrine when they do engage in battle. According to Ray Salt (letter) the Prairie Falcon may actually be dominant over the Peregrine in aerial conflict. A number of instances are known in which sites long occupied by *peregrinus* have been taken over by *mexicanus* (Allan Brooks, A. P. Marshall, letters). Although the reverse is sometimes observed (Marshall, Truesdale, oral communications), the possibility is not eliminated of serious competition between these two species, especially for high cliffs in which there is only a single good pothole or ledge. Similar competition may occur with the Gyrfalcon (*Falco rusticolus*) in the far north, but on this point I have no information.

5. *Biomes and life-zones.*—There appears to be no correlation whatever between the distribution of eyries and any of the life-zones. The known area of rarity (see map) includes much of the Palouse-prairie climax, but the correspondence is by no means exact.

6. *Altitude.*—Whether because of food supply, atmospheric conditions, or other factors, Peregrines are rarely found to nest above about 5,000 feet elevation. There are exceptions, however, and a few pairs are known to nest up to 10,000 feet (Donald D. McLean, letter). In the Sierra Nevada, Rocky Mountains, and elsewhere in the west, there are tremendous cliffs, especially above timberline, that are devoid of Peregrines, although Golden Eagles are not rare and Prairie Falcons may be quite common up to 6,000 or 7,000 feet in suitable localities and sometimes nest considerably higher. At about 7,000 feet, trained Prairie Falcons, with their much greater surface-to-weight ratio clearly outfly trained Peregrines that are their superiors at sea level (H. Webster, oral communication, and personal observations).

7. *Intermountain area.*—In the area between the Rockies and the Sierra-Cascade mountain chain, the known density of nesting Peregrines is extremely low, and this surely is not due simply to lack of knowledge. There appears to be only a single authentic

nesting record for the whole state of Nevada (Wolfe, 1937). I know of five records for eastern Oregon, but none for eastern Washington or for the Snake River valley of Idaho. Nor is this a matter of lack of nesting sites, for cliffs of every description abound. In this area, which is shown in figure 22 to include all of Washington except the northern coast, there is less than one known nest site per 20,000 square miles, whereas in the areas where Peregrines are mapped as being "common," there is slightly more than one known pair per 2,000 square miles. Possible factors influencing population density are:

a. Competition with the Prairie Falcon in the center of abundance of the latter. (See item 4.)

b. Altitude. A good deal of this interior country is at elevations above 5,000 feet. (See item 6.)

c. Water. Water is scarce in the Great Basin, and almost all of the Peregrine nests known to me anywhere are within one-half mile of at least enough water for bathing. The Prairie Falcon is less dependent on water, being habitually a dust bather. One eastern Oregon nest, mentioned by Gabrielson and Jewett (1940), is eleven miles from the nearest water, at least in dry years, but the next greatest known distance is about three miles, and the site was within one mile of water before Lower Klamath Lake was drained.

d. Climate. It is possible that dryness and heat are harmful or disagreeable to the Peregrine, but at least two pairs nest along the lower Colorado River in California and two or three nest in the extreme northeastern part of the state; some in eastern Oregon are in areas equally hot and dry in the breeding season.

8. *Food supply.*—As in the east, an especially good food supply may be an attraction, but Peregrines nest in places that seem to be about as low in prey as are most areas without any falcons.

#### POPULATION FLUCTUATIONS

A. *Age of present nesting sites.*—In California, collectors have taken eggs over a longer period and more regularly than in other parts of the west. Herbert De Tracy (letter, 1941) writes of a site in Monterey County occupied "for 50 years to my knowledge," although he did not collect there until 1902 and took his last set there on April 6, 1937, after which the birds moved about half a mile and nested under a ten-foot overhang. Nelson Carpenter told me of a site in San Diego County collected for 29 consecutive years (up to about 1930). A. P. Marshall (letter, 1937) writes: "On April 8th, 1932, a friend of mine offered to show me a nesting site from which he had collected a set of four eggs on March 26th., 1896 (set now in my collection) and imagine my surprise when a shot from my pistol brought forth Mr. Duck Hawk . . . A nice set of four eggs was secured . . . Thirty-six years had passed since this site had been visited and it was still in use . . . Some .22 artist killed [the birds] last year. I visited the site a few days ago but found no birds, however, a pair of birds were located about two miles south of this site and I'm sure are ready to nest." Sharp (1907) says that one "pair" in southern California occupied the same cliff 20 years to his knowledge and "were old residents before that." This is the site taken over by Golden Eagles (Dixon, 1937) in 1916; thus, the cliff was occupied at least 30 years. J. B. Dixon told me the nest mentioned by his brother (J. S. Dixon, 1906) was in use as late as 1940, although it had been occupied by Prairie Falcons in some years.

There is no reason to suppose that many of the western eyries have not been occupied continuously for far longer than the records show.

B. *Deserted eyries.*—There are too many cases of eyries being "deserted" and then reoccupied after a year or two, to warrant acceptance of reports of desertion based on only a single visit. For example, according to Marshall (letter, 1937), "The pair on



... have nested eight consecutive years to my knowledge." In 1939, some quarrying was done on the cliff, and during that year the birds were absent; but they returned to nest in 1940 when the disturbance abated. Moreover, there is quite a number of instances in which it appears that a pair moves about erratically among several "third class" cliffs, to use Hickey's term, any one of which may be used and then "deserted" for many years although a "new" site a mile or two or three away is occupied the next year, apparently by the same birds. Eleven sites definitely deserted together with what is known of them are listed in table 2. Causes of desertion are as follows: Numbers 1

Table 2  
Deserted Eyries

Number	Site	Class	Last year of known use
1	Sea cliff (earth)	2nd	1932 (about)
2	Sea cliff (earth)	2nd	1930 (about)
3	Sandstone cliff (inland)	2nd	1934
4	Rock sea cliff	2nd	1929
5	Lava cliff	1st	1936
6	Rock cliff	2nd	1935
7	Sandstone cliff	1st	1932 (about)
8	Sandstone cliff	1st	1929
9	Rock cliff	1st	1916
10	Rock cliff	1st	1926
11	Rock cliff	?	1887
12	Rock cliff	2nd	1930 (about)
13	Granite cliff	1st	?
14	Basalt cliff	2nd	1915-20

and 2, highway built close to cliff edge, beach much used. Number 3, unknown; occupied by Prairie Falcon most years since 1935. Number 4, "location where formerly nested now a sort of Sunday holiday location and usual bunch of guns" (Carriger, letter, 1941). Number 5, see Dixon and Bond (1936), Bond (1937); "There is a trap shooting club against part of the [cliff] and fewer hawks and owls than I have ever seen there. . . . I found no falcon nests there" (L. L. Schramm, letter, 1940). Number 6, cause unknown. Number 7, "Sunday picnicking and shooting" (Truesdale, oral communication). Number 8, cause unknown. Number 9, driven off by Golden Eagles (J. B. Dixon, 1937). Number 10, Dawson's site near Santa Barbara; cause of desertion unknown. Number 11, Mearns (1890); not present in 1939 according to a letter from Mrs. Earl Jackson to Hickey; cause and date of desertion unknown; I have not seen this cliff and do not know how Hickey would classify it. Number 12, "Shot out?" (J. B. Dixon, oral communication). Number 13, cause and date of desertion unknown. Number 14, deserted shortly after a road, much used by hunters, was built under the cliff.

Cowan (letter, 1939) and Brooks (oral communication) state that several sites in the Okanagan Valley in British Columbia, formerly occupied by Peregrines, are now used by Prairie Falcons, but I have no further data on these.

In addition, there have been three desertions which, it is hoped, are temporary and which were caused by operations of the armed forces. Two of these are on sea cliffs almost directly under coast artillery or AA batteries, and the third cliff is used as the back-stop for a small-arms range. It is not known if any of the birds was killed. Two of these pairs reoccupied the nesting cliffs in the summer of 1945, although they are not known to have nested (Zuk, oral communication).

C. *Newly used eyries*.—I know of only one newly occupied eyrie. This is a second-class conglomerate cliff where Prairie Falcons had long nested (Marshall, oral com-

munication; Bond, 1936b). When Dr. Marshall went to collect these in 1939, he found the cliff in possession of a pair of Peregrines which have occupied it each year that it has been visited since.

There are a good many records of third-class cliffs being newly occupied, but these cases seem to be the consequence of the "desertions" of the third-class cliffs as already described.

D. *Future of the Peregrine in the west.*—The constantly increasing human population west of the Rockies cannot do other than cause a decrease in the Peregrine population to some extent. The increasing numbers of hunters and of others with guns will certainly be too much for the more vulnerable pairs, especially when it is remembered that they are not protected by state or national law anywhere in this great area. In many places, the very cliffs that attract the birds also attract picnickers with their noise and disturbance, and frequently with their .22's. At the same time, the Peregrine is tenacious, is not easy to shoot and, after reaching adulthood, is usually very wary. The ability of Peregrines to maintain themselves in Massachusetts and around New York City speaks well for their future in the younger west. Moreover quite a number nest in state and national parks and monuments where they are subject to little or no molestation, and many others nest and feed in areas where they are very nearly impregnable.

#### FACTORS AFFECTING SURVIVAL

A. *Eggs and young.* 1. *Clutch size.*—I have not made any exhaustive search for clutch records. A few examples which have been recorded are summarized in table 3.

Table 3  
Clutch Size

Number of eggs	<i>pealei</i>	Alaska and Canada	U.S. except southern California	Southern California	Mexico	Total
1					1	1
2				2	3	5
3			3	7	8	18
4	6	4	11	14	10	45
5	2	1	3	1	1	8
Total	8	5	17	24	23	77
Average	4.50	4.20	4.00	3.58	3.30	3.70

Marshall (letter, 1937) says: "From personal observations of local birds [southern central California] I would say four eggs constitutes the usual compliment of 80 per cent of my records, the rest but three eggs. . . . Certain females will invariably lay four eggs, others but three, and I suppose some five or more."

Carriger (letter, 1941) states: "From what information I have [from central California], four eggs is the usual number, occasionally three or five; apparently a bird that lays five eggs will continue to do so year after year; apparently this does not follow with one laying three." In this connection, several egg collectors have told me they thought first-year adults often laid one egg less in their first nesting season than in subsequent years. This might explain Carriger's findings in the case of three-egg sets.

Nelson Carpenter told me (oral communication, 1939) that sets of two eggs are much commoner in Baja California than they are in California. L. W. Walker and J. E. Green (oral communication, 1939) offered no exact figures, but said they shared Carpenter's impression. Willett (1917) and Green (1916) both give four eggs as the normal complement of *pealei*, although they do not list any specific sets.

This is substantially the reverse of the trend shown by Hickey's (1942:187) table 3 for eastern North America, which shows increasingly large clutches from the Arctic to the United States. However, my records of Arctic birds and those of *pealei* are too few to be dependable.

One doubt about my figures, and about those of Hickey, is that most of them are taken from sets in various collections. Egg collectors, like other humans, are attracted by the unusual, and their take probably represents a certain amount of deviation from the true average, a deviation which may well be significant.

2. *Second clutches and egg collectors.*—I have many records of cliffs visited after the first set of eggs was taken, and it appears certain that a considerable majority of the pairs lay a second set if the first is taken. However, the observer has seldom bothered to climb to the nest when he did not mean to collect, and records of the number of eggs in the second set are available only in nine instances. The size of the first and second clutches, respectively, in the same nest in the same season in these instances are as follows: 5-3, 5-3, 4-4, 4-4, 3-3, 3-3, 3-3, 3-3 and 3-3. Incubation of the second set ordinarily began within 30 days of the time the first set was collected. Green (1916) says of *pealei* that if the eggs are taken fresh, a second set is laid in about ten days, but if incubation is advanced, the second set is not produced for about three weeks.

J. B. Dixon told me (1946) of a nest found by him and J. S. Dixon in 1902 which was visited periodically (though not every year) through 1931. On every visit there were three light-colored eggs. These were never collected, but Mr. Dixon believed them to have been the product of a single female because of their being laid each year on approximately the same date, because of there always being three eggs, and because of their similarity in pattern and color. In 1932 this eyrie was visited at the usual time and found to contain four young. In 1933 the site was visited about a month earlier than usual, and four dark, well marked eggs were collected. A second set of four was soon laid, and out of curiosity also collected. Still later in the season a third set of four was taken. The female then laid a fourth set, but by that time the weather was so hot that the cliff was not climbed again, so the number of eggs was not determined. All twelve eggs taken were fertile.

In the time since Peregrines were first discovered nesting in the west, several hundred sets of eggs must have been collected. Some of these birds failed to lay a second clutch, and probably in some instances second clutches were also taken. This sort of molestation has probably caused desertion of some of the less favorable cliffs. All in all, however, I must agree with Hickey that egg collectors have not been seriously detrimental to the Peregrine. Although there are certainly more active collectors in the west than in the east, their numbers as in the east have declined markedly in recent years.

3. *Nesting success and nest losses.*—Hickey (1942:188) concludes that "about one egg in every set fails to hatch." There are certainly cases of infertile or addled eggs in the west (see Willett, 1921, for example), but such data as I have fail to show a loss approaching 25 per cent from this cause. It certainly is not true of the nest reported by Dixon in the preceding section. On the other hand, I have several records of the loss of the last hatched fledgling, especially in the first few days of life. My unsupported guess is that this loss is commoner when the last-hatched birds is a male, and therefore small, and commoner when the number of eggs is five than when it is four or three (for a case, see McCabe and McCabe, 1937). There are also cases of pairs that apparently failed to lay at all (personal observations). Eggs are also destroyed by enemies other than man. J. B. Dixon (oral communication) reports a nest in San Diego County, California, that can be looked into but not reached by man; the eggs were destroyed in 1940 by

some unknown agent. He also tells me of an eagle alighting on a Peregrine nest and breaking the eggs either by accident or on purpose.

Another cause of nest failure is exemplified by a Mexican eyrie visited by Walker (oral communication) in which for at least three years all or most of the young were never able to fly because of abnormal feather growth. One nestling female had normal wings, but her tail was in continuous molt (in captivity) for over a year. Two young males had at all times so many missing primaries and secondaries that they never flew, and the one on exhibition in the San Diego Zoo had great difficulty in reaching a low perch. It was permanently in a state similar to that of a mallard in the eclipse plumage.

Green (1916:475-476) says the Haida Indians believe that "the best way to bring a west wind is to visit an eyrie and hurl the eggs or young to the west into the sea, and for an east wind to go to the other side of the island." These Indians have dwindled to a remnant of their former numbers, and the motor boat has displaced the dugout sailing canoe, so perhaps this cause of nest destruction no longer operates.

4. *Falconry and pet-keeping.*—I believe I know of most of the Peregrines that have been taken from the nest by falconers, or would-be falconers, at least since 1935. During that period I learned of eight nests that had been robbed, some in more than one year, for a total of less than 25 fledglings. Of these, one at least escaped in full health and under the most ideal conditions for survival. One was shot within a few yards of its protesting owner; one escaped and was shot a few days later; two died in the hands of "trainers"; four died in zoos; and of the rest I have no knowledge. So far, it does not appear that this has been a very serious drain on the population. The reader is referred to Spofford's (1945) excellent paper on this subject.

I know of three Peregrines acquired by falconers after they left the nest. One individual was found shot during the duck season; it escaped after it was nursed back to health, but before it was fully trained. The other two birds were trapped as adults, but no regular trapping of migrating Peregrines is practiced in the west.

B. *Mortality after leaving the nest.* 1. *Causes of death.*—As is true of most birds, the majority of Peregrines that are fledged die in their first year. Hickey (1942:192) states that "Man is the adult Peregrine's worst enemy." This is doubtless true if first-year birds are excluded. I suspect, however, that this latter group suffers more seriously from other causes, although from what, I do not know—perhaps starvation or disease. Certainly man plays a prominent part in reducing their numbers, but I cannot believe that gunners every year kill a number that must nearly equal the whole breeding population, or even a major part of it. Surely the forces that kept the species in equilibrium in the days before the white man must still operate, particularly in those parts of the west in which gunners are rare as in the Aleutians, Baja California, and much of the Great Basin region where the birds are not rare in fall and early winter.

One cause of death not mentioned by Hickey is botulism. This disease struck Tule Lake, California, in the fall of 1937 (Bond, 1939) and two first-year Peregrines that became diseased from eating sick ducks were run down on foot by CCC boys. They would doubtless have died or have been killed by some carnivore, even if humans had not found them. Adults present in the same area and skillful enough to take healthy prey apparently did not suffer. This disease may be of considerable importance at least in some years.

L. W. Walker states (letter, 1946) that "in late May or early June [on a Mexican island where two or three pairs nest] an adult [Peregrine] was seen to knock a young bird into the surf and probable death." The young bird was not seen again after striking

the water. Walker interprets the incident as defense of territory by the adult against a bird from another nest.

Spring records of Peregrines in the juvenal plumage or undergoing the first molt are extremely rare. I have seen only one such bird in life (mentioned above), and Hickey (1942) refers to five.

2. *Life expectancy*.—If all Peregrines shot by all collectors were skinned, and if old adults were no more wary than juveniles, it should be possible to calculate the life expectancy from museum collections. I have done this for the Sparrow Hawk in the west (Bond, 1942) but have not considered it worth trying for the Peregrine. However, for what it is worth, the Museum of Vertebrate Zoology contains 25 skins of *anatum* and *pealei*; of these only five are adults, and one is molting into adult plumage. There is one other such specimen in the Dickey Collection.

Carpenter (oral communication, 1939) tells me that evidence from the eggs taken from the same eyrie for 29 consecutive years show only three females to have been present. De Tracy (letter, 1941) records the same female for five years, but he did not collect at the site again until after a lapse of 29 years when there was another female present. If the nest reported by J. B. Dixon (discussed above) actually had only one female from 1902 to 1931, inclusive, this must be something of a record. Since the eggs were never collected, however, the point cannot be determined by direct comparison of the sets.

#### ACTUAL SIZE OF THE TOTAL POPULATION

The total size of the breeding population of western North America may be estimated at 750 pairs (including *pealei*) of which somewhat less than half are in the United States. As anyone who has studied the bird with any care will realize, this is a gloriously wild guess, but I am sure the actual population is more than twice the known population (328), and I would be surprised if it should be much over five times that, or 1500. If these beliefs are correct, my estimate would be well within the range of error common to estimates for big game populations.

#### EFFECT OF THE PEREGRINE ON OTHER WILDLIFE

1. *Food*.—Peregrines undoubtedly can and probably sometimes do kill and eat practically any bird that is reasonably near their own size. Major Brooks told me of seeing a Peregrine swoop at a Black Brant (*Branta bernicla nigricans*) and break its wing, although the falcon was driven off before completing the kill. L. W. Walker reports (oral communication) a Peregrine's killing a wobbly pelican (*Pelecanus occidentalis*) which was evidently on a premature flight induced by the presence of humans. Especially when the young are small, the parents commonly bring them Horned Larks (*Otocoris alpestris*), House Finches (*Carpodacus mexicanus*), blackbirds (*Euphagus* sp.), bluebirds (*Sialia* sp.) and similarly small passerines. Stager (1941) reports Peregrines taking bats (*Tadarida mexicana*) in Texas; and Bond (1936c) has reported the eating of a brush rabbit (*Sylvilagus bachmani*). Major Brooks has told me of a recently fledged Peale Falcon on an island off the British Columbian coast eating the huge slugs (*Ariolimax*) that are native there.

Western Peregrines also kill ducks on occasion, and I have seen them take individuals of several species, including Green-winged Teal (*Anas carolinensis*), Gadwall (*Chaulelasmus streperus*) and Shoveller (*Spatula clypeata*), and I have found remains of Mallard (*Anas platyrhynchos*), and Ruddy Duck (*Erismatura jamaicensis*) at nest sites. I do not know, however, of a single Peregrine that has used ducks as its main food, even for short periods, with the exception of two or three in immature plumage that

were living on cripples during the hunting season and those observed by the critical eye of Major Brooks and reported by him to me orally. Crippled birds, for some reason, seem to hold a fascination for Peregrines, and devices used by falconers for capturing falcons are usually baited with a tethered (hence apparently disabled) pigeon, to which the Peregrines are frequently attracted even though their crops are already as full as possible.

Although the extraordinary powers of flight of the Peregrine perhaps allow it to indulge in gustatory fancies that less skillful hunters cannot afford, its usual food consists of birds of moderate size and speed and of little or no game value. In Alaska, on the Yukon, Osgood and Bishop (1900:74) report their feeding on "marsh hawks [*Circus cyaneus*], Alaska jays [*Perisoreus canadensis*], white-winged crossbills [*Loxia leucoptera*], intermediate sparrows [*Zonotrichia leucophrys*], and varied thrushes [*Ixoreus naevius*]." Peale Falcons are said to feed on Ancient Murrelets (*Synthliboramphus antiquus*) (Green, 1916; Heath, 1915), on puffins, auklets and murrelets (Willett, 1915), on Rhinoceros Auklets (*Cerorhinca monocerata*) and Cassin Auklets (*Ptychoramphus aleuticus*) (McCabe and McCabe, 1937), or on Ancient Murrelets, Marbled Murrelets (*Brachyramphus marmoratus*) and Cassin Auklets (Darcus, letter to Griffie, 1935).

Farther south along the coast in Oregon, shorebirds, and sometimes nestling murrelets (*Uria aalge*), are standard prey of the Peregrine (Stanley G. Jewett, oral communication and personal observations) as well as Cassin Auklets (personal observations). In California, on the coast of Monterey County, a farmer told me the Peregrines were known as "Pigeon Hawks" because of their taking Band-tailed Pigeons (*Columba fasciata*) when the latter fed in the open grain fields. He also stated that the falcons could not catch the pigeons in the timber, and most of the time lived on "sea birds." From a locality a few miles farther south, Marshall (letter) reports that "young cormorants furnish the bulk of the food for the young," and that non-breeding phalaropes also receive "quite a little attention" in summer. Marshall states further that in the fall and winter Peregrines take crippled and winged ducks, and that Coots (*Fulica americana*), where present, are taken the year around. On the southern California coast, I have reported Coots and Horned Grebes (*Colymbus auritus*) as prey (Bond, 1936c), and I have seen the falcons capture Cassin Auklets, nestling cormorants (*Phalacrocorax auritus*), a Black Oyster-catcher (*Haematopus bachmanii*), and a Pigeon Guillemot (*Cepphus columba*).

Still farther south in California, L. Zuk (letter) reports shorebirds to be almost the sole food of three of the four pairs on which he made observations in the summer and fall of 1945. A fourth pair, in addition to eating shorebirds, raided a neighboring city for pigeons (*Columba livia*). This is the only far western pair that I know of that makes regular use of this food, although there are many records of Peregrines in the east and in Europe that make city pigeons their staple diet.

Off the coast of Mexico, Howell (1910, 1912) tells of Peregrines killing murrelets, auklets and petrels. Kaeding (1905) says they breed commonly on all islands where Cassin Auklets breed. Lamb (1927) speaks of their living largely on Black-vented Shearwaters (*Puffinus opisthomelas*), on a group of Mexican islands.

In interior British Columbia, J. A. Munro told me the Coot is the commonest prey. The same species furnished most of the food for one family of Peregrines in eastern Oregon, according to Stanley G. Jewett (oral communication).

In the Sacramento-San Joaquin Valley in California, I have seen Peregrines capture (in winter) nearly equal numbers of crippled ducks and healthy Coots. I never happen



to have seen any other kind of prey taken in that region and at that season.

Practically the entire population of Peale Falcons is outside the range of game ducks and the same is true of probably 75 per cent of the Mexican pairs of *anatum*. Furthermore, probably not over half of the pairs of *anatum* of the western United States and Canada live where they can do much damage to ducks, and even these seem to prefer coots and shorebirds. When these facts are considered and when it is noted that the figure for ducks given me by the Flyway Biologist of the Fish and Wildlife Service in 1945 is "close to 5,000,000" in the Pacific flyway, it appears that the "Duck Hawk" cannot be a very serious drain on the duck population.

2. *Fear*.—I have heard it said that a breeding or winter-resident Peregrine will frighten away the ducks (or other game birds) from its locality. As is well known, birds pursued by a hawk give every evidence of extreme fear, but they seem to recover their normal behavior within five or ten minutes, and I have seen a flock of Sanderlings in Ventura County, California, resume feeding within thirty seconds after one of their number was taken by a Peregrine. The ducks at the Santa Barbara Refuge showed only momentary disturbance when the wintering Peregrine stooped over them for his daily Coot, and they certainly were as abundant as usual (Bond, 1936c).

#### RECOMMENDATIONS

Hickey offers a number of recommendations at the close of his article, and they are good ones, but few of them are applicable to the west, where many of the Peregrine cliffs are on public land and where no state or province protects the bird. My only suggestions are as follows:

1. To second his plea that the name "Duck Hawk" be abandoned as inaccurate and prejudicial to the species, and that "American Peregrine Falcon" or Peregrine Falcon" be used as in Canada.

2. To urge continued efforts to educate the public as to the rarity, reputation, and harmlessness (at least as a species), looking to the day when enforceable laws can be passed for its protection.

3. That authors and editors take care not to publish the location of an occupied eyrie.

4. That further studies by means of banding as well as observation be undertaken.

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## THE RUFOUS-WINGED SPARROW, ITS LEGENDS AND TAXONOMIC STATUS

By ROBERT T. MOORE

Few species have suffered so much from conjecture and inspired guessing as the Rufous-winged Sparrow, *Aimophila carpalis*. Discovered by Bendire in 1872 (Ornith. and Ööl., 7, 1882:121), it was so abundant near Rillito Creek, Arizona, that forty-three nests with eggs, besides a number containing young, were found by him "in a strip of country scarcely a mile long" and yet about two decades later it was reported "extinct." Since my name has been associated to some extent with this species for the past thirteen years and because certain of my conclusions have been questioned by van Rossem in his distributional survey of the birds of Sonora (Occas. Pap. Mus. Zool., Louisiana State Univ., No. 21, 1945:274-275), I may be pardoned for attempting to dispell a few of the legends which have shrouded the Rufous-wing by bringing out some factual data. Here are the legends:

(1) It was declared "extinct," at least in the United States. Yet in June, 1932, at Fresnal, Arizona, in the Papago Indian Reservation, it was readily encountered. Within one hour after our tent was raised on June 22, I collected my first specimen of *Aimophila carpalis*. Three more were obtained within the next twenty-four hours. Success was due chiefly to the habit of using field-glasses.

(2) The decrease and final extinction of the Rufous-wing was said to be correlated with the decrease of the sacaton grass, the bird requiring this association to survive. On the contrary, so far as the southern representatives of this species are concerned, the sacaton grass by no means determines the habitat of the bird. In the Moore Collection are forty-nine specimens of this species from Sinaloa alone taken at fourteen collecting stations scattered over the Tropical and Upper Tropical zones, from sea level to 3000 feet, and from as far south as Elota, only fifty-five miles north of Mazatlan. They were obtained in many localities where sacaton grass does not grow.

(3) It was declared to have emigrated en masse to Mexico. This is so preposterous, it needs no refutation.

To the foregoing van Rossem (*loc. cit.*) has now added further generalizations which, if they are carelessly repeated by other authors, will give an exceedingly inaccurate picture of the habits and characteristics of the Rufous-wing. These new generalizations are:

(a) The southern race, "*bangsi*," is simply *carpalis* on its "winter range"; in other words all the individuals found in southern Sonora and the host in Sinaloa are migrants of the northern form. In the literature on *Aimophila carpalis* can be found warnings from keen observers of the past which should lead an investigator to assemble all possible data before suggesting so profound a change in the concept of habits. Bendire (*loc. cit.*), the discoverer of the species, called it a "resident" in the vicinity of Tucson and found it "abundant both Summer and Winter!" Furthermore, Baird, Brewer and Ridgway (N. Amer. Birds, Land Birds, 3, 1875:515) mentioned a "female, in winter plumage" taken near "Tucson, January 10, 1873," and winter birds were taken by others across the Mexican border. Swarth (Pac. Coast Avif. No. 10, 1914:57), obviously believed Bendire's statement to be true, stating: "Probably resident, as specimens have been taken in January as well as in midsummer." Regarding these authors as reliable reporters, I made a special trip to Fresnal, Arizona, in January of 1933 and found the Rufous-wings actually *abundant*, and yet just as well concealed by their association

with Chipping Sparrows as they had been the previous June. I collected a series. What is the evidence from individuals taken in Sinaloa? The Moore Collection has specimens obtained in *every* month of the year. Can a species "winter" the *entire year* five hundred miles south of its nesting-area? This group of fifty-two individuals was taken for the most part far south of the previously known range of *bangsi* of southern Sonora. The species is common in Sinaloa throughout the year. Furthermore, not one of the specimens appears to be true *carpalis*. The evidence indicates that the species is not truly migratory; it probably moves only short distances during the winter months in search of new areas of food.

(b) The next claim, referring to *bangsi*, states that the "chief character supposed to distinguish it (slightly smaller average size) results from a preponderance of first-year birds in the southern series." This statement is generally true of the series in the Dickey Collection, but the description of *bangsi* and its published measurements were not based on that series (except for a few unquestioned adults forming a small percentage of the whole aggregation), but on the series of fully adult birds in the Moore Collection as well as the large array of adults in the museums of the East and Midwest. Furthermore, measurements of new adult specimens, taken later than the date of the description (Moore, Proc. Biol. Soc. Wash., 45, 1932:231-234) from near the type locality, confirm the smaller size as well as the other characters, including the "more rounded wing," disregarded by van Rossem.

(c) Van Rossem further states categorically: "There is a complete absence of southern records between June 22 and November 5." The employment of the word "records" was properly cautious. The very collector who supplied many of the specimens to the Dickey Collection, J. T. Wright, was aware that the Rufous-wings are resident during July, August and September in the region of the type locality of *bangsi*, namely, at Guirocoba and at Colmoa, less than ten miles from Guirocoba. Furthermore, Wright has supplied the Moore Collection with eighteen birds taken by him in this area between July 25 and September 11. In addition, four other individuals were secured by Chester C. Lamb in northeastern Sinaloa (Guamuchil) between September 18 and October 4, 1933.

(d) Continuing, he adds: "It may be noted that specimens personally collected in southern Sonora between May 6 and June 22, 1937, showed only the beginning of sexual activity" and "none were paired." On the other hand Lamb's field notes prove that late April and May are definitely periods of "sexual activity." A pair taken by him (nos. 9434 and 9436, Moore Coll.) at Reforma, Sinaloa, May 3, 1934, had sex organs noted as "well developed" and "full size," and may have been nesting.

(e) Van Rossem states further concerning the "specimens personally collected" by him that "all were in various stages of the complete prenuptial body and tail moult. The type of '*bangsi*' is in the midst of this moult." It is clear he believes that molting individuals could not be in a state of full "sexual activity." The facts prove the contrary to be true. As in other species that breed in the Tropical Zone, some individuals of *Aimophila carpalis* present feathers in process of molt in every month of the year, as amply shown by our specimens, but this in nowise proves they were not breeding. A bird taken on February 27, as well as January specimens, have short new rectrices still in their sheaths, and yet many March individuals have completed their prenuptial molt. On the other hand some July and August birds are in the midst of molt, whereas a bird of September 18 has all of its old tail feathers and most of its primaries and secondaries badly worn while a new secondary in the right wing is tiny and in its sheath. This last individual is an adult, no. 7914, collected by Chester C. Lamb at Guamuchil,

Sinaloa, and was recorded in his journal as follows: "singing from the top of a cardon . . . it had *fully developed testes* and swollen anus." An adult male, collected at the same place on October 2 (no. 7916 Moore Coll.) is in almost the same condition (old, badly worn rectrices, secondaries and remiges, except for inner ones) and is noted as having "enlarged testes." An adult female (no. 7915 Moore Coll.), taken at Guamuchil by Lamb on October 2, 1933, has almost all its old feathers badly worn, but one or two of the inner remiges are short and freshly molted. The type of *bangsi* is a bird of large measurements for its race and larger throughout than the average measurements of the 32 adult males, which were measured for the original description. The question whether it was in molt or not is irrelevant.



Fig. 25. Locality near Fresnal, Arizona, where Rufous-winged Sparrow was rediscovered; Baboquivari Peak in the distance.

(f) Finally in refutation of van Rossem's statement that "the species has never been shown to breed in southern Sonora" there are several specific instances of nesting. J. T. Wright, in his journal writes under date of August 31, 1933, at Colmoa (less than ten miles from Guirocoba, Sonora), the following: "Noted Rufous wing sparrow getting material for nest" and under date of September 11, 1933, at the same place: "Collected eggs of R. W. Sparrow [Rufous-winged Sparrow], nest of sticks lined with horse hair, in brush about 3 feet above ground." As it is one of the most abundant birds of Sinaloa, none of our collectors had been urged by me to find nests. But they could not help happening on some. For example, on October 2 of the same year Chester Lamb shot a female as it flew from its nest to the ground and the nest contained "three heavily incubated eggs." This was found at Guamuchil, Sinaloa, one hundred miles to the southwest of Colmoa. The specimen is no. 7915, mentioned above as having barely begun its molt with only a few inner remiges bursting through their still clinging sheaths.

*Aimophila carpalis*, when its shroud of misconceptions is dispelled, emerges as a rather normal species. Its known nesting localities indicate the species probably breeds from Arizona to Sinaloa. It does not "migrate" in the ordinary sense of the word. It does not do so solely to obtain seeds of "sacaton." Like many desert forms with tropical representatives, the northern elements may move a short distance in search of larger food areas—more than the southern ones, which reside where supplies are greater. Until January, 1933, it was still a common winter resident near Fresnal. Undoubtedly



Fig. 26. Rufous-winged Sparrows were taken among grasses in foreground where they were feeding; near Fresnal, Arizona.

it still breeds in favored localities in near-by parts of Arizona. On all three occasions when I visited Fresnal (June, 1932, January, 1933, and April, 1933) I obtained specimens. Whereas it was uncommon in April, and only four were observed and collected in June, it was actually abundant in January. My experience with it confirms much that has been written about it by observers of seven decades ago, particularly the account by Bendire (*op. cit.*). It is certainly resident and gregarious, probably "at all times" of the year, for all my observed birds in late April, June, and January were found in mixed company. Whether searching for seeds under the mesquites and cacti, or sitting on the former, or taking off in flight, they were invariably accompanied by Chipping Sparrows. Generally they proved to be the shyest members of mixed flocks of Black-throated, Chipping, White-crowned and Lark sparrows. In contrast with their tameness in Mexico, they flew long distances when approached. Perhaps the use of sling-shots by the young Indians of the Agricultural Station accounted for this difference.

Concerning the "rediscovery," my journal, typewritten each night in camp, contains the following information. The first bird I collected this afternoon proved to be one of them—a Rufous-wing. It was one of an apparent pair (male and female) skulking

in a mesquite a short distance east of the water tank of the Indian Agricultural Station, where we were camped. I called to my assistant, Waddell Austin, to collect the other bird of the pair, and he promptly complied. When we shot the first two, I had identified two other birds by their flight-pattern moving north with the Chipping Sparrows to the plateau rim of our shallow arroyo a mile away, and I now followed them. I found the pair among some Black-throated Sparrows and quickly obtained one of them. It had run on the ground out of a clump of mesquite and, like all others, was extremely shy, in great contrast with the Black-throats, which sought the highest twigs of the bushes and ocatillos to observe my approach. The Rufous-wing's companion escaped, but the following morning, slightly west along the mesa rim, toward which it had flown, I located and collected him. Not one of these four Rufous-wings was heard making any sound, not even a call-note.

The field marks of this form in Arizona, distinguishing it from the Chipping Sparrows, consist of three: At close range, if a binocular can be used or the bird's wing is raised, one catches the flash of rufous on the bend of the wing. I identified my first one in this way. At medium range, the upper parts show paler gray, less brown. In the air the flight has a slight, but perceptible periodic dip, a definite contrast to that of the Chipping Sparrow. This never failed me for correct identification.

It seems almost certain that Bendire is correct that this northern form has two broods each year, since he found nests in Arizona from June 14 to September 1, the last with "fresh eggs." Baird, Brewer and Ridgway (*loc. cit.*) record that "one nest with four eggs was found September 11, 1872." That the southern representatives may also be double-brooded, or nest irregularly over a long period as frequently occurs with tropical forms, is indicated by our data. Nests were discovered between August 31 and October 2, and several specimens were collected in April and May, with sex organs "fully developed."

I have examined all the sixty-three new specimens that have come into the Moore Collection since the original description of *bangsi*, have measured all the adults, and have compared them with my enlarged series from Fresno, Arizona (April, June, and January), taken a little more than fifty miles from the type locality of the nominate race. In addition, on different occasions, I have re-examined some of the extensive series employed in my original paper. These efforts confirm the characters given in the original description. It should be pointed out that the lighter color of mandible and tarsi in *bangsi* is obvious only when one has before him freshly dried specimens of both *carpalis* and *bangsi*, which fortunately I possessed when the original description was written. The other two characters, smaller size and more rounded wing are attested by the new material. The measurement difference is an average of seven-plus per cent for the total average of wing and tail length of both sexes, the tail differences being greater.

The re-examination of our new material has revealed a more important matter. The thirty-six specimens, taken in central and southern Sinaloa from Rancho El Padre at about latitude 26 degrees, south to Elota, at about latitude 24 degrees, have dimensions even smaller than in *bangsi* and in addition there are color characters. This large series is so uniform and so well differentiated that it is herewith given a name.

*Aimophila carpalis cohaerens*, new subspecies  
Sinaloa Rufous-winged Sparrow

*Type*.—Adult male in prenuptial plumage, no. 18157, collection of Robert T. Moore, taken at Elota, southern Sinaloa, Mexico, March 25, 1937; collected by Chester C. Lamb.

*Subspecific characters*.—Nearest to *Aimophila carpalis bangsi*, but in all plumages dark streaks of back wider and more prominent; lower throat and flanks darker gray; in postnuptial plumage

margins of feathers of back browner (less gray) and back much darker; chestnut of pileum darker; wing-tip much shorter. Compared with *Aimophila carpalis carpalis*, *cohaerens* shows the same differences, but to much greater degree; in addition wing and tail average nine per cent smaller, wing-tip fifty per cent smaller and wing much more rounded.

*Range*.—Apparently confined to the Sinaloa and Tebaca faunal districts from Elota just north of latitude 24 degrees in south-central Sinaloa north to Sinaloa River in northern Sinaloa and altitudinally from sea level to 3000 feet at Rancho El Padre.

Average and extreme measurements of races of *Aimophila carpalis*

	Adult Males		
	Wing	Tail	Wing-tip
16 ad. <i>cohaerens</i>	57.2 (54.4-59.1)	59.1 (53.8-61.9)	3.4 (1.8-5.3)
16 ad. <i>carpalis</i>	63.0 (59.9-64.8)	63.2 (61.5-65.6)	7.2 (4.7-9.5)
32 ad. <i>bangsi</i>	58.1 (55.3-61.2)	57.8 (52.1-61.8)	6.3
	Adult Females		
	Wing	Tail	Wing-tip
13 ad. <i>cohaerens</i>	54.6 (53.2-56.4)	57.5 (52.2-60.9)	3.0 (1.6-4.3)
9 ad. <i>carpalis</i>	59.7 (57.1-61.5)	61.8 (59.9-64.2)	7.3 (4.3-9.5)
10 ad. <i>bangsi</i>	56.8 (55.7-58.1)	56.7 (54.1-60.9)	7.2

*Cohaerens*, meaning "adjoining," refers to the continuity of the habitat of the species southward.

*Aimophila carpalis bangsi* is a proved breeding bird of the southeastern Sonora area and *cohaerens* of central and south-central Sinaloa. Therefore, to prove the validity of *bangsi* we need consider chiefly its characters, which still hold true.

One important thing seems to have been clarified by our large accession of new specimens, namely, that the races of *carpalis* are almost certainly resident and do not migrate in the strict sense of the term. Of the sixty-three specimens of the species taken since the description of *bangsi*, six are from Guirocoba, Sonora, two others from other localities in that state and some are from Arizona. Of forty-nine specimens taken in the state of Sinaloa, thirteen of them were secured close to the Sonora line north of the Fuerte River and the balance of thirty-six were obtained from the Sinaloa River south. The former are *bangsi* and the latter *cohaerens*. A single male from El Fuerte, Sinaloa, is an intergrade and lies geographically exactly between these two races.

*Cohaerens* has the wing and wing-tip shorter in males and in females than in *A. c. carpalis*. The more rounded wing of *cohaerens*, as compared with the nominate race, is even more marked than in *bangsi*. The wings of *cohaerens* are only slightly shorter than those of *bangsi*, the tails differ little. On the contrary in length of wing-tips, *cohaerens* and *bangsi* differ greatly in both sexes, while *bangsi* and *carpalis* differ little. In the original description of *bangsi*, I did not have space in the table to give the comparative length of wing-tips, which is, of course, different than the difference in length of longest primary and longest secondary from *base*. In choosing birds to measure I have eliminated all specimens in which the primaries and secondaries show a different amount of wear. In this species new secondaries almost invariably develop before the new primaries. When comparing coloration, I have been most careful to compare fresh plumages with fresh plumages, and worn with worn.

Since we have very large general collections taken from extreme southern Sinaloa south through Nayarit and Colima and from east of the Sierra Madre Occidental and since from these areas there is not a single specimen of *A. carpalis*, it seems clear that *cohaerens* represents the southernmost representative of the species. This is the first time that anyone has had the opportunity of inspecting a large freshly-taken series of *A. carpalis* from Sinaloa. From the examination it becomes clear that the birds of southeastern Sonora and those north of the Fuerte River in Sinaloa (*bangsi*) are a uniform series of intermediates. They are differentiated from *Aimophila carpalis carpalis*



of Arizona and northern Sonora by smaller size, especially wing and tail, paler mandibles and tarsi and more rounded wings. Two courses lay open for the taxonomist, either to recognize *bangsi* as a well-marked intermediate between true *carpalis* and *cohaerens*, or permit it to sink into the synonymy of *carpalis*. The decision will be influenced by the individual attitude of the taxonomist, based upon his predilection for or against the recognition of uniform intermediates. It has been my policy not to describe intermediates even when uniform in characters. This time I did it, unconscious of the existence of an "end-race" farther to the south. Therefore, this matter of recognition of *bangsi* is immaterial to me, but, if the race is finally reduced to synonymy, similar action should be taken to synonymize many other recently proposed races from Mexico based solely on intermediate characters less trenchant than those of *bangsi*.

*California Institute of Technology, Pasadena, California, December 18, 1946.*

## GEOGRAPHIC VARIATION IN THE EGGS OF CACTUS WRENS IN LOWER CALIFORNIA

By GRIFFING BANCROFT

This paper reports a study of the sizes, shapes and colors of the eggs of the Cactus Wrens (*Heleodytes brunneicapillus*) of Lower California. Its purpose is to trace, through analysis of pigmentation and dimensions, some of the heritable geographic variations of these birds.

The eggs of *Heleodytes brunneicapillus* are divisible into four major groups: the Rio Grande, the Colorado Basin, the Western and the Peninsular. (As yet I have been unable to examine material from New Mexico.) The names selected are suggestive of the area from which each comes, although there are irregularities along part of the boundary between the Western and the Colorado Basin groups. The Rio Grande group is confined to the eastern side of the Continental Divide; the other three are represented in Lower California.

The Peninsular group is endemic to Lower California. It consists of all eggs derived from the area from Cape San Lucas north to, approximately, the thirty-first degree of latitude. The western part of the northern boundary of the range can be drawn with fair precision. The line starts slightly north of San Antonio del Mar and skirts the southern slope of Sierra Cresta Blanca. It follows the western foothills of the Sierra San Pedro Mártir as far as that range extends southward. The northeastern boundary runs from the southern tip of the San Pedro Mártirs to the Gulf of California, but little is known of the direction it follows. The probabilities are that the Mesa Alta sets the boundary.

Cactus Wrens within the area assigned to the Peninsular group are isolated from all others of their species. A possible exception occurs in the little known northeastern corner. From just north of San Antonio del Mar until the Tijuana Valley is reached, a matter of a hundred miles, there are no Cactus Wrens. Between Mount San Jacinto, in California, and the lower end of the Sierra San Pedro Mártir there is no place where the birds can cross the Peninsular Range. The waters of the Pacific, together with those of the Gulf, surround the rest of Lower California.

Within the area outlined, however, Cactus Wrens occur continuously. It is true that there are regions, some very large, which are too nearly sterile to support the wrens, but nowhere do these barrens become total barriers. None extends from one coast to the other. There are no mountains or other obstacles that stop interchange; such limitations on the exchange of blood lines as may exist are the intangible barriers of flora and climate, not the physical geography.

The determining factor in assigning eggs from the peninsular part of Lower California to a specific major group is neither their isolation nor their continuity. It is the fact that they are distinguishable, through color and markings, from the eggs of all other groups of Cactus Wrens. I cannot too strongly emphasize that this statement applies only to averages. Individual variations are so great throughout the species that inferences simply are not to be drawn from single specimens. However, certain types do not occur on the Peninsula.

If there were assembled a series of twelve or fifteen representative, run-of-the-mine sets from any one locality, any oologist familiar with these eggs in numbers could tell at a glance whether or not they were laid within the area we are discussing. This is true because nowhere else is there even an approximation of the large percentage of the



light-colored type which is found in the Peninsular area. The egg that is characteristic of the region has a light-brown ground color and is marked with small, faint reddish dots, faintly applied. Not rarely the dotting is so delicate as to seem to be absent. In other localities this type might be found once in six or eight sets; here it is to be expected in four out of every five.

There is another characteristic which distinguishes the Peninsular from the other western groups—a characteristic less convincing only because it is negative. One of the rarer types of Cactus Wren eggs has a pure white background. It may be very lightly spotted, it may be so heavily marked as to appear crusted, or it may be anywhere in between. It is unusual in two respects: in spite of its wide variations it does not blend into the more nearly normal type, and it never has been reported from the Peninsula of Lower California. Yet there are localities, especially in the Colorado Basin, where one set in every eight or ten is of this kind.

Parenthetically, it should be explained that the reason egg colors are not diagnosed statistically is because of two mechanical complications which I, at least, have not been able to overcome. It has not been possible for me to assemble for comparison, at any one time, all the material on which I am working. Also, collectors specialize on the freakish and rarer colorations to an extent that hopelessly distorts averages. It is to be regretted that this is so, for pigmentation is important in geographic variation.

The first step in gaining an understanding of the Peninsular group of wrens is a realization that the color of the egg has been determined hereditarily. The alternative is to believe that the tint and the markings on the shell have been brought about by external influences. If that were so, one wonders what those influences could be. Certainly not food. Examine a large series of Elegant Tern eggs or a series of murre eggs. Among them one will find an almost infinite variety of colors, markings and composition. Except as between two eggs laid by the same female, each is readily recognizable. Yet in any colony there has been but one diet for all terns, but one diet for all murre.

In an aviary, with a number of species feeding from but one tray, the eggs of unrelated birds show no tendency to develop resemblances. Captivity of parent does not affect markings in any manner that can be detected by oologists. Indeed, if pigmentation were influenced by anything in the environment, climate, altitude, soil, or plant associations, we collectors long ago would have discovered that fact. Our weakness is avarice for brilliantly marked eggs, but in our search for them we find only accumulating indication that the one general factor responsible for pattern is heredity.

If we accept egg colors as a manifestation of heredity, which surely we must, then we have recognized, in addition to the Peninsular group of eggs, a group of birds physically different in their egg-producing mechanism from any other group. The question of whether or not the differences in egg-producing machinery have been paralleled by other differences, either adaptive or accidental, is in a way extraneous to this study. Nevertheless it is quite in order to note that it would be astonishingly out of keeping with our experiences in the practical workings of evolution should any group of birds differ from its neighbors in one inherited fundamental respect and yet be identical with them in all others.

The segregation of the Peninsular group by the method here used might seem more convincing if its eggs were all of the characteristic type and if that type were found nowhere else. It is not the incomplete differentiation that obscures the analysis, however. It is the fact that the colors have not been expressed in mathematical terms. Could that have been done and had we a table showing precise values and frequencies of occurrence of each, the *t*-test for the significance between two means could be applied.

The Peninsular group of eggs is itself divisible, through comparative measurements, into subgroups. I have compiled a table of measurements of all eggs of the group to which I have had access; they are fairly representative of about half the geographic range. Of the four subgroups disclosed, three have been described and given scientific names and, since there seems to be no doubt of the validity of the various subspecies thus designated, I naturally have followed accepted nomenclature. The designation Punta Prieta is intended merely to suggest the geographical center of the fourth subgroup.

	Sets	Eggs	Cc. <sup>1</sup>	Axes	Ratio of axes
<i>H. b. affinis</i>	12	32	3.58	24.50 × 17.20	1.42
<i>H. b. purus</i>	36	72	3.37	24.04 × 16.84	1.43
Punta Prieta	5	11	3.92	25.40 × 17.68	1.44
<i>H. b. bryanti</i>	54	152	3.59	24.73 × 17.14	1.44

<sup>1</sup> Cubic contents, in cubic centimeters, are approximated from the only two measurements made, those of the major and the minor axes. The formula used is based on  $\pi ab^2 \div 6$ . However, since an egg is not a perfect geometrical figure, it has been found that the actual size is less than the calculated size. Because egg shapes are widely variable, no fixed percentage of correction is applicable. Tests seem to show that if the egg is assumed to be 94.4 per cent of  $\pi ab^2 \div 6$ , the figure that has been adopted throughout this paper, the error rarely will be greater than one per cent. In any event, for comparative purposes this error may be disregarded *in toto*.

Of the 36 sets of *H. b. purus*, two, of 3.52 and 3.47 cc., respectively, came from San Ignacio Lagoon on the Pacific Ocean. Eight are from the vicinity of Santa Rosalia, from the narrow strip between the shores of the Gulf and the almost perpendicular eastern side of the peninsular mountains. These averaged 3.31 cc. The remaining 26 sets, averaging 3.38 cc., were collected on the cooler western slopes, at altitudes of from 1200 to 1800 feet. From this and other evidence we know that the belt of small eggs extends all the way across the Peninsula and, by so doing, definitely isolates the birds of San Quintín from those of the Cape region.

Before attempting to interpret the table it must be made clear that the analysis of dimensions deals only with averages. The value of averages depends in part on the number of specimens totalled and in part on the percentage of divergence. In the case of Cactus Wrens I like to have 25 sets and 100 eggs with which to establish the value for a station. Even with half these numbers, however, if the birds are relatively homogeneous within the area and if the sampling has been representative, more data seldom are productive of material changes in average values.

The differentiation of subgroups presupposes that the size of an egg is determined by the heredity of the mother. This tenet, as the *sine qua non* of this investigation, should be held to the strictest proof. Space, however, permits no more than a sketch of the sustaining evidence.

To a limited extent the size of an egg is a matter of chance or else is determined by non-heritable factors of which we have no definite knowledge. If this were not so, all the eggs of any one set would be identical. But eggs within a set do vary. To analyze the differences I have chosen the 54 sets of *bryanti*, having more of them than of any other subgroup, and have compared lengths, the most variable dimension. In the 16 sets of two the difference between the eggs averages .7219 mm.; in the 32 sets of three, .5767 mm.; in the 6 sets of four, .5886 mm.; in the 54 sets as a whole, .5953 mm. The smaller figure in the larger sets is due to the fact that the latter normally contain at least two eggs which are virtually identical.

When the 152 eggs under consideration are subjected to the method known as the analysis of variance, by which the variance within and between clutches is compared as an indication of homogeneity, we find that there is less than one chance in ten thou-

sand that individual egg variation, as exemplified by the differences within the sets, could account for the differences between sets.

Similarly, average sizes show definite individualities in the subgroups. For instance, if we apply the *t*-test for the significance between two means to the 54 sets of *bryanti* and the 36 sets of *purus*, the significance *P* is .006 and the coefficient of divergence 5.64 per cent. As between *purus* and the 5 Punta Prieta sets the significance *P* is .0002 and the coefficient of divergence 13.78 per cent. This establishes these differences as reliable and not due to chance or error in sampling, in spite of wide fluctuation and frequent overlapping. There is proof that the averages of eggs from certain areas are unlike eggs from other areas. That this is not due directly to food or environment will be shown. This process of elimination is offered as proof that the variances are due, directly, to heredity. Mr. Laurence M. Klauber worked out with and for me much of the statistical mathematics. I am greatly indebted to him and to his specialized knowledge.

The best evidence that egg sizes are not governed wholly by food or similar outside influences is given us by commercial poultrymen. Here there have been found no effective means, except selective breeding, of obtaining the large eggs that are desired.

There is no place better than San Ignacio in which to illustrate that the character of the country the wrens inhabit has no direct bearing on the size of their eggs. The environs of that pueblo are the most nearly barren of any area which supports an appreciable number of these wrens. Both the Cape Region and the canyons about El Rosario are so much more fertile that the difference is apparent to any casual traveller. Less obvious is the important fact that the total food supply in the central area shows relatively little difference between the laying and the non-laying months. This impoverished condition is disclosed by the comparative number of eggs in individual sets. Three's are quite common with *affinis* and with *bryanti*; they are virtually unknown in *purus*, except that, in 1930, when there was an almost unprecedented rainfall in San Ignacio, we did take several three's and even one four. The number of eggs in a set, of course, within the limitations of heredity, is an expression of the divergence between the maximum and minimum food supplies of any region. Here it is indicative of the barrenness of San Ignacio.

If sterility of environment would explain small Cactus Wren eggs anywhere, it would do so in central Lower California. That it does not is shown by conditions at the northern extreme of the Pacific range of the species. There is a subgroup which inhabits what is probably the most fertile part of the entire habitat of *brunneicapillus*. The area in question includes the Ventura, Simi and San Fernando valleys in southern California. It skirts the foothills of the San Bernardino Mountains and continues through Azusa at least to the eastern boundary of Los Angeles County. To date I have measured 209 eggs from this section. Their averages, 23.76 x 16.77 and 3.30 cc., are smaller than any from Lower California.

In contrast to the coastal valleys, the Mojave Desert is inhospitable. In fertility it might be considered as a mean between them and El Rosario. I have measured 209 eggs from Palmdale and Victorville through to Wickenburg, in Arizona. The averages are 24.62 x 17.15 mm. and 3.58 cc., virtually the same as the figures for *bryanti*. Bordering the San Fernando subgroup on the south, in apparently the same type of associations and with no recognizable line of demarcation, lies a subgroup whose eggs are the largest of the entire Western group.

Such contradictions as have been cited could be multiplied indefinitely, for there simply is no pattern—no pattern, that is, that connects the nature of the country inhabited with the size of the egg. The largest eggs I have are from Punta Prieta, the

smallest from Guaymas. It seems to me that the probability is strong that if a female from either of those regions were transplanted to the other, the size of her eggs would not be affected. If they would not be, then the control must be heredity.

The hypothesis that egg colors and sizes are indices of inheritance clarifies an important portion of the history of the Peninsular group of wrens. We have the picture of a one-time single group of eggs of distinctive mass coloration, a group which eventually split into smaller units identifiable by measurements. This picture is logically and, I believe, technically correct.

There is evidence to support the belief that not only in Cactus Wrens but also in birds in general egg colors and markings have come down through the ages with less alteration than have many other physical qualities. With the few exceptions of protective coloration, egg tints do not enter into the struggle for survival.

The Western group is composed of the darkest eggs of any of the Cactus Wrens. The territory it occupies is the western watershed of southern California from the Tijuana Valley to the northern limit of the range of the species. A subgroup extends southward from north-central San Diego County to the Tijuana Valley, and that subgroup, in turn, is broken down into three divisions. One centers around Escondido, one around the bay region of San Diego and the other, in Lower California, apparently is confined to a small area east of Rodriguez Dam.

Eggs from the Colorado Basin, except for some confusion at the western end of San Geronio Pass, are more brilliantly colored and have a far greater percentage of sets with white backgrounds than those from either the Pacific or Gulf of Mexico watersheds. One of the subgroups extends southward from the international line in a gradually narrowing triangle between the Cocopah Mountains and the Colorado River bed. The birds breed freely both in the heavy riparian growths of the Delta and the cholla associations above the ancient shore line.

Undoubtedly the subgroup that occurs on the eastern slopes of the mountains in San Diego County also extends into Lower California—there is no break in the continuity of the country; but I have been unable to examine any specimens from that area. In any event, eggs of the western end of the Colorado Basin groups are to be found in Lower California in an area that is small indeed when compared to the one covered by these groups in the United States and on the Mexican mainland. The analysis of the eggs from either of the northern corners of Lower California belongs more properly to a specific discussion of each group as a whole.

When distinguishable groups of birds are separated by geographical isolation, a satisfactory picture is to be had. Pressure from within against fixed borders might be expected to spread the differentiations evenly throughout the subgroups. In the Peninsular group of Cactus Wrens there are, however, no geographical barriers, in fact, no barriers of any kind that are readily discernible. Virtually the only factor I have been able to discover is that, as one goes south, plant development and the breeding season of the wrens come progressively later in the season. That does not help much in telling us why there is more than one race of Cactus Wrens on the Peninsula, or why the hereditary types do not diffuse back and forth from San Antonio del Mar to San Jose del Cabo to produce a single homogeneous species.

This paper, admittedly, is but one step of an investigation into why there are several subgroups within each of the three groups of Cactus Wrens under discussion. Tabulations of measurements of eggs both from north and east of the Peninsula will prove helpful, as will correlation of the information we already have with an accurate revision of the taxonomy of *brunneicapillus*.

*Cuyamaca Club, San Diego, California, July 1, 1945.*

## THE BIRDS OF LAHONTAN VALLEY, NEVADA

By J. R. ALCORN

Notes for the preparation of this check-list of the birds of the Lahontan Valley, Churchill County, Nevada, were started in August, 1940, and continued until May 30, 1945. Most observations were made incidental to other work, while the writer was employed by the Museum of Vertebrate Zoology (for a short period), and by the United States Fish and Wildlife Service.

In addition to the notes taken within the period stated, a few miscellaneous notes taken prior to August, 1940, and published records available for the years 1936 to May, 1945, inclusive, have been used. Records prior to 1936 are covered by Linsdale (1936: 1-145). In most instances, sight records have not been considered substantial evidence for the recording of a species new to the area.

Dr. Alden H. Miller has given valuable assistance in the identification of most of the new or uncommon species collected and Mr. Joe T. Marshall, Jr., identified the song sparrows. Observations made by Mr. Vernon L. Mills, employed during part of this time as Nevada State Game Warden, have been used and they contribute much toward the completeness of information on the occurrence of many species. The nomenclature, both scientific and vernacular, advocated by Grinnell and Miller in their "Distribution of the Birds of California," has been followed, rather than that of the A.O.U. check-list.

The area covered by this report is bounded on the southeast by Carson Lake, on the north by Carson Sink and on the west by the east end of Lahontan Reservoir. Mahala, Soda Lake, Fallon and Stillwater all lie within this area. No observations were made in any of the foothills surrounding the valley. The elevation of the valley ranges from 3875 feet in the Carson Sink to 4162 feet at Lahontan Dam.

Within the past fifteen years, the Carson Sink in dry seasons has contained little or no water; however, in other seasons, water covers much of the area. At the present writing, shallow water covers many square miles of this sink. Epidemics of botulism poisoning occasionally occur in this area (Alcorn, 1944: 300).

The creation of the Truckee-Carson Irrigation District and the development of irrigation dams and irrigated farms have contributed considerably toward environmental change in the valley since 1911. Prior to that date, large trees of any kind were uncommon. At the present writing tens of thousands of large cottonwood trees are growing in the valley. In addition, Russian olive, locust and other exotic trees, shrubs and plants are abundant. These changed environmental conditions have probably contributed much toward an increased bird population in the area.

Because no extensive collecting of specimens was undertaken, additions, especially among the smaller birds, may be expected. The specimens that were collected by the writer are, for the most part, in the Museum of Vertebrate Zoology. Most of the specimens taken by Mills were mounted for display purposes and many of these were deposited in the Nevada State Museum at Carson City.

*Gavia immer*. Common Loon. Infrequent visitant during spring and fall migrations. One was obtained by Mills on April 12, 1942. Others were taken on October 31 and November 3, 1940. A lone individual was seen on October 31, 1940.

*Colymbus nigricollis californicus*. Eared Grebe. Resident. Sight records are available for all months of the year. Two were obtained on June 18, 1940. These birds were especially abundant on Soda Lake in late summer and three nests containing 4, 4, and 2 eggs, respectively, were seen about 9 miles north-northeast of Fallon on July 3, 1943.



*Aechmophorus occidentalis*. Western Grebe. Resident. Sight records are available for all seasons of the year. One adult and two small young were taken on August 25, 1940. Widespread on small ponds and lakes in summer. Less numerous in winter, occurring only on larger lakes.

*Podilymbus podiceps podiceps*. Pied-billed Grebe. Resident. Sight records are available for all months of the year except June. One was obtained on November 12, 1939. In summer individuals were seen on lakes and reservoirs. More widespread in winter, lone individuals occurring on lakes, ponds, canals, and rivers. A nest containing young was photographed by Mills on July 14, 1942.

*Pelecanus erythrorhynchos*. White Pelican. Summer resident. Seen in all months except January and December. These birds were most abundant from March to July, inclusive, of each year. Present from August to November in small flocks on large bodies of water, especially in the Carson Sink area. There is no known nesting colony in this region, the nearest being Pyramid Lake about 50 miles northwest. Examination of 18 pelican stomachs revealed the remains of 6 species of introduced fishes and the remains of one native species (Alcorn, 1943a:34-36).

*Pelecanus occidentalis californicus*. Brown Pelican. Linsdale (1936: 30) reports that one of these birds was seen in company with White Pelicans about 10 miles north of Stillwater on May 20, 1934. This is the only record of this bird in this area.

*Phalacrocorax auritus*. Double-crested Cormorant. Summer resident. Seen in all months except February and March. Most abundant and more frequently seen from July to October of each year. Lone individuals or small flocks containing less than five birds were frequently seen in canals and on small ponds. Large flocks containing twenty-five to one hundred birds were seen on larger bodies of water.

*Ardea herodias*. Great Blue Heron. Resident. Observed on many occasions in each month of the year. Specimens of *A. h. ireganzai* in the Museum of Vertebrate Zoology were taken on August 28 and November 17, 1940. Nests containing young were seen in cottonwood trees  $2\frac{1}{2}$  miles north of Stillwater on July 5, 1941.

One specimen of *A. h. hyperonca* was obtained 4 miles west of Fallon on November 13, 1939. It is not known what percentage of the blue herons in this valley belong to this race but they are probably in the minority (Alcorn, 1941a:118).

*Butorides virescens anthonyi*. Green Heron. One was obtained 4 miles west of Fallon in September, 1934 (Alcorn, 1940:169). There are no other records of this species for this area.

*Casmerodius albus egretta*. Common Egret. Resident. One was obtained on October 14, 1940. Sight records are available for each month of the year except March. Mills reports that in July, 1940, he saw a nesting colony of these egrets about 3 miles north of Stillwater. They reportedly nest there each year.

*Leucophoyx thula brewsteri*. Snowy Egret. Summer resident. Abundant from April through September of each year. Records of stragglers are available for October, November, and December. A nesting colony was seen about 3 miles north of Stillwater in July, 1940, and nests containing eggs or young were seen in the same locality on July 5, 1941.

*Nycticorax nycticorax hoactli*. Black-crowned Night Heron. Resident. Numerous sight records are available for all seasons. Most abundant and widespread in August. Nests containing young were seen on July 5, 1941, about 3 miles north of Stillwater.

*Ixobrychus exilis hesperis*. Least Bittern. One was taken 4 miles west of Fallon in September, 1935 (Alcorn, 1940: 169). No others have been seen.

*Botaurus lentiginosus peeti*. American Bittern. Resident. Specimens were taken on August 28, 1940, and November 13, 1939. More numerous in summer than winter.

*Mycteria americana*. Wood Ibis. Summer visitant. Seen in June and July of 1935 and 1936. Also recorded by Linsdale (1936: 33) near Fallon on July 25, 1930.

*Plegadis guarauna*. White-faced Glossy Ibis. Summer resident. Most abundant from May to August, inclusive. One colony situated about 3 miles north of Stillwater contained nests with eggs and young on June 21, 1940. Again on July 5, 1941, nests with young were seen in this same area. In August, flocks containing 50 to 2000 birds are commonly seen feeding in the alfalfa fields during irrigation.

*Cygnus columbianus*. Whistling Swan. Winter visitant. Swans were seen in all months from October to March, inclusive. Most abundant in November, December and January when large flocks frequently were seen. One was obtained on November 5, 1940.

*Branta canadensis canadensis*. Canada Goose. Resident. Frequently seen throughout the year. Specimens were taken on November 21, 1940, and on January 18, 1942. These geese nest in the Carson Sink and Carson Lake areas. Two adults accompanied by five young were seen April 24, 1945.

*Branta canadensis occidentalis*. One of two geese taken on January 18, 1942, from a flock of about thirty Canada Geese, belonged to this race (Alcorn, 1943b:40). No other records are available for this goose in Nevada.

*Branta canadensis leucopareia*. Winter visitant. Canada Geese judged to belong to this race were frequently seen from October to February, inclusive. Specimens were taken on November 24 and December 14, 1940, and on January 14 and November 28, 1941.

*Branta canadensis minima*. Winter transient, but not in large numbers. Hunters report obtaining a few of these each winter. This was partially confirmed by the examination of one (of several killed) that was shot by Mr. Ned Kendrick on December 4, 1943. This specimen was deposited in the Museum of Vertebrate Zoology (no. 88977).

*Anser albifrons albifrons*. White-fronted Goose. Transient; but not numerous. Flocks containing less than six birds were seen in March, May, September and December. Specimens were taken in April and December (Alcorn, 1940: 169). Hunters report killing a few of these geese each season (October to December).

*Chen hyperborea hyperborea*. Snow Goose. Winter visitant. Large flocks, containing thousands of birds, were seen in October and November. Less numerous in other months from September to February. In addition one small flock was seen flying northward on April 12, 1943. Many of these geese are killed each season by hunters.

*Dendrocygna bicolor helva*. Fulvous Tree-duck. One was shot by a duck hunter (Mr. William Fisher) from a flock of about 20 birds, 14 miles west of Fallon on November 14, 1940. The remains (wings, feet and head) of this bird were salvaged for identification (Alcorn, 1941a:118).

*Anas platyrhynchos platyrhynchos*. Mallard. Resident. Present in large numbers at all seasons. Nests containing eggs were seen in April, May and June.

*Anas cyanoptera*. Cinnamon Teal. Resident; abundant in summer. Its nests and young were often seen. Less numerous in winter.

*Anas discors*. Blue-winged Teal. Only one record is available for this teal in Churchill County. On April 1, 1939, Mills saw and obtained a solitary male at Mahala Slough (Alcorn, 1940:169).

*Anas carolinensis*. Green-winged Teal. Resident; abundant in all seasons except in summer. Present in summer in limited numbers; a few young were captured and raised until fully grown.

*Anas acuta taitzihoa*. Pintail. Resident; abundant. Many small young and nests with eggs were seen in spring months.

*Mareca americana*. Baldpate. Resident. Abundant from October to April, inclusive. Less numerous in summer months. No nests or young birds have been seen.

*Chaulelasmus streperus*. Gadwall. Resident. Abundant at all seasons. These ducks nest in this area in considerable numbers.

*Spatula clypeata*. Shoveller. Resident. Abundant in winter months, less numerous in summer. Eggs and small young have been seen frequently. This duck is relatively more abundant in the Soda Lake district than elsewhere.

*Aix sponsa*. Wood Duck. Winter transient, in limited numbers. Sight records are available for the period from September to January, inclusive. Specimens were taken in October, November and December (Alcorn, 1940:169). Those seen were usually in canals west of Fallon.

*Nyroca valisineria*. Canvasback. Winter visitant and transient. Seen in limited numbers from October to April, inclusive. Also recorded on July 22, 1942.

*Nyroca americana*. Redhead. Resident. Most abundant in fall. Small young and nests containing eggs were seen.

*Nyroca collaris*. Ring-necked Duck. Winter transient, but not abundant. Recorded from October to March, inclusive. Specimens were taken in January, March, October and November.

*Nyroca marila nearctica*. Greater Scaup Duck. One was taken by Mills on November 20, 1938, near Soda Lake (Alcorn 1940: 169). No other records are available.

*Nyroca affinis*. Lesser Scaup Duck. Winter visitant and transient. Seen in limited numbers each month of the year, except August and September, when none was observed. Most abundant in winter. No nests or young have been seen.

*Glaucionetta clangula americana*. Common Golden-eye. Regular winter visitant. Recorded in November, December, January and February. Most common in December and January.

*Charitonetta albeola*. Buffle-head Duck. Winter resident; but not abundant. Seen in all months from October to June, inclusive. Most common in December, January, and February.

*Melanitta fusca deglandi*. White-winged Scoter. Specimens were obtained on November 3, 1940, November 12, 1940 (Alcorn, 1941a:118-119), and again on November 2, 1941. No others have been seen.

*Melanitta perspicillata*. Surf Scoter. Two birds were shot by Ward C. Russell on October 19, 1940. Another specimen was obtained on November 12, 1940 (Alcorn, 1941a:119). No others have been seen.

*Erismatura jamaicensis rubida*. Ruddy Duck. Resident. Abundant in all seasons of the year. Adults accompanied by small young were frequently seen at Mahala.

*Lophodytes cucullatus*. Hooded Merganser. Winter transient. Not numerous. Individuals were seen in November, January and February. Dead birds were examined in December, January and February.

*Mergus merganser americanus*. Common Merganser. Winter visitant and summer transient. Abundant from November to February, inclusive. Also seen in October, March, April and June.

*Mergus serrator*. Red-breasted Merganser. Transient. Specimens were taken in April and November. Birds were seen in November and December. Not abundant.

*Cathartes aura teter*. Turkey Vulture. Summer resident. Seen each month from March to October, inclusive. Most sight records are for May.

*Accipiter gentilis atricapillus*. Goshawk. Transient. Lone individuals were seen and obtained in February and March (Alcorn, 1940: 169-170). Other individuals were seen in September and November.

*Accipiter cooperii*. Cooper Hawk. Winter visitant. Transient in summer. These birds were seen in each month of the year except June and July.

*Accipiter striatus velox*. Sharp-shinned Hawk. Common winter visitant. Sight records are available for all months except June and July.

*Buteo jamaicensis calurus*. Red-tailed Hawk. Resident; most abundant in winter, scarce in summer.

*Buteo swainsoni*. Swainson Hawk. Summer resident; frequently seen from April to August, inclusive. This hawk nests in cottonwood trees in considerable numbers throughout the valley.

*Buteo lagopus s. johannis*. Common Rough-legged Hawk. Winter resident; noted each month from November to March.

*Buteo regalis*. Ferruginous Rough-legged Hawk. Winter resident; not abundant. Noted each month from October to March.

*Aquila chrysaetos canadensis*. Golden Eagle. Resident; most abundant in winter months. One nest, containing 2 small young, was seen in a cottonwood tree about 2 miles north of Stillwater on May 13, 1936.

*Haliaeetus leucocephalus*. Bald Eagle. Winter visitant. Small numbers were seen each month from November to February (Alcorn, 1940: 170).

*Circus cyaneus hudsonius*. Marsh Hawk. Common resident. Numerous records are available.

*Pandion haliaetus carolinensis*. Osprey. Summer visitant; not numerous. Individuals were seen in April, May, August, September and October.

*Falco mexicanus*. Prairie Falcon. Resident. Noted on numerous occasions in each month.

*Falco columbarius bendirei*. Pigeon Hawk. Winter visitant. Not common. An example of this race was taken on November 12, 1941, and another on April 11, 1944.

A specimen of *F. c. suckleyi* was taken on January 19, 1941 (Alcorn, 1943b:40). No other records are available.

*Falco sparverius sparverius*. Sparrow Hawk. Common resident; seen on many occasions. A nest containing 4 eggs was seen on May 17, 1942. Three partially grown young were seen perched on a nest box on June 27, 1943.

*Alectoris graeca*. Chukar Partridge. Resident; not abundant. Noted frequently in the vicinity of Stillwater and west of Fallon in the cultivated area.

*Lophortyx californica*. California Quail. Common resident. In 1941 nests containing eggs were seen on April 30, May 31, June 12 and 13, and July 13.

*Phasianus colchicus torquatus*. Ring-necked Pheasant. Common resident. Seen on numerous occasions. Nests containing eggs were seen on July 20, 1941, and on April 10, 1942.

*Grus canadensis*. Sandhill Crane. Migrant. Frequently seen in March and April, the only months that it was recorded.

*Rallus limicola limicola*. Virginia Rail. Resident. Seen in March, April, July, October and December.

*Porzana carolina*. Sora Rail. Resident. One was taken on January 17, 1940; others were seen in July, August, October and November.

*Gallinula chloropus cackinnans*. Black Gallinule. Transient. A specimen was taken on October 8, 1940, by Mills. Others were seen on August 29 and 30, 1942.

*Fulica americana americana*. American Coot. Resident. Abundant at all seasons.

*Squatarola squatarola*. Black-bellied Plover. Specimens were obtained on September 25, 1940, and in October, 1943. Others were seen by Mills on September 27, 1940 (Alcorn, 1941a:119).

*Charadrius semipalmatus*. Semipalmated Plover. Two specimens were taken by Mills on May 6, 1941. Others were seen on May 7, 1942.

*Charadrius nivosus nivosus*. Snowy Plover. Obtained on July 26 (Alcorn, 1942a:81) and on August 1, 7, and 8, 1941, and seen by Mills on July 11, 1942.



*Oxyechus vociferus vociferus*. Killdeer. Resident. More abundant in summer than in winter. Young were seen on July 9 and 18, 1939, and on May 5, 1942. Also one nest containing 4 eggs was seen on May 5, 1942.

*Eupoda montana*. Mountain Plover. Several specimens were taken from a small flock on November 6, 1940. On November 15, 1940, additional specimens were taken (Alcorn, 1941a:119).

*Numenius americanus*. Long-billed Curlew. Present in summer in limited numbers. This bird reportedly nests in the vicinity of Carson Lake. Recorded in April, May, June and July. Also there is one sight record for December 10, 1941.

*Limosa fedoa*. Marbled Godwit. Transient. Specimens were taken, or birds were seen, in April, July, August, September, November and December (Alcorn, 1940: 170).

*Totanus flavipes*. Lesser Yellow-legs. Transient. Obtained on April 23, 1941, and also taken by Mills on April 24, 1941. Probably more numerous than records indicate.

*Totanus melanoleucus*. Greater Yellow-legs. Resident; not numerous. Seen in all months except February and May.

*Tringa solitaria cinnamomea*. Solitary Sandpiper. Transient. A specimen was taken by Mills in September, 1940. One was found dead at Soda Lake on July 27, 1941 (Alcorn, 1942a:81). Others were seen on April 25, 1941, and June 25, 1941.

*Actitis macularia*. Spotted Sandpiper. Summer resident. Frequently seen in all months from April to September, inclusive.

*Catoptrophorus semipalmatus inornatus*. Willet. Summer resident; not common. Recorded from April to September, inclusive.

*Arenaria interpres morinella*. Ruddy Turnstone. One was picked up dead at Soda Lake on July 26, 1941. It apparently died, along with other birds, of botulism poisoning (Alcorn, 1942a:81).

*Limnodromus griseus*. Dowitcher. Common transient; most abundant from September to December. Recorded each month of the year except March and June. A specimen of the race *scolopaceus* was taken on October 14, 1940.

*Capella delicata*. Wilson Snipe. Resident. Frequently recorded each month from October through April of each year. Also seen less often in May, August and September. Not seen in June or July.

*Crocethia alba*. Sanderling. Transient. Specimens were taken on May 10, July 26, and September 22, 1941 (Alcorn, 1941b:294), and on May 18, 1942. Others were seen on September 22 and October 2, 1941.

*Ereunetes mauri*. Western Sandpiper. Transient. Numerous records are available for May, July, and August.

*Erolia minutilla*. Least Sandpiper. Transient. Specimens were obtained, or birds were seen, in April, May, August, September, October, November and December.

*Erolia alpina pacifica*. Red-backed Sandpiper. A lone individual was seen and obtained at Soda Lake on May 2, 1941.

*Micropalama himantopus*. Stilt Sandpiper. Three were observed by John W. Slipp (1942:62) on July 30, 1939, between Hazen and Mahala. No other records are available.

*Himantopus mexicanus*. Black-necked Stilt. Summer resident. Recorded frequently from the middle of April through August. One sight record is available for March and one for September.

*Recurvirostra americana*. American Avocet. Summer resident; abundant. Numerous sight records are available for the period from the middle of March through October. Also seen frequently in the Carson Sink area in November. There is one December record. Five nests containing eggs were seen on May 8, 1941. Another nest containing 4 eggs was seen on May 30, 1941.

*Steganopus tricolor*. Wilson Phalarope. Summer resident. Seen frequently from April 15 through August.

*Lobipes lobatus*. Northern Phalarope. Transient; seen frequently in July, August, September and October. Obtained or seen on three occasions by Mills in May, 1942.

*Larus delawarensis*. Ring-billed Gull. Resident. Recorded in every month except June. Most abundant from October through December. No known nesting colony is situated in this area (Alcorn 1943c:199).

*Larus argentatus smithsonianus*. Herring Gull. Winter visitant. One was taken on January 13, 1942. Large individual gulls occasionally seen in winter months possibly belonged to this race.

*Larus californicus*. California Gull. Summer resident. Abundant from April to August, inclusive. Many nest each summer on an island in Lahontan reservoir.

*Larus philadelphia*. Bonaparte Gull. Transient. Specimens were taken in May, June, August and November (Alcorn, 1940: 170). Others were seen in May, June, July, September, October, November and December.

*Chlidonias nigra surinamensis*. Black Tern. Summer resident. Frequently seen from April 30 through August. They nest in the Carson Lake area each year.

*Hydroprogne caspia caspia*. Caspian Tern. Summer resident. Frequently seen from April 15 through September. A few nest each year on a small island in the Lahontan reservoir.

*Sterna forsteri*. Forster Tern. Summer resident. Frequently seen in May, June and July. Other records are for April and August.

*Columba fasciata monilis*. Band-tailed Pigeon. A lone individual was obtained 4 miles west of Fallon on October 17, 1940 (Alcorn, 1941a:119).

*Zenaidura macroura marginella*. Mourning Dove. Resident. Most numerous in summer months. Recorded in each month of the year. A nest containing 2 small young doves was seen on July 4, 1941, a nest containing 2 eggs was seen on August 11, 1941, and a nest containing 2 eggs was seen on June 21, 1942.

*Coccyzus americanus*. Yellow-billed Cuckoo. Summer resident; not numerous. Seen each year from May to August, inclusive. Individuals were observed on nine separate occasions in July, 1941.

*Tyto alba pratincola*. Barn Owl. Resident; occurs in limited numbers. Individuals were seen in February, March, July, August, October and December. Eighty-nine Barn Owl pellets from Soda Lake were examined and were found to contain remains of five species of mammals and three species of birds (Alcorn, 1942b:128-129).

*Otus asio inyoensis*. Screech Owl. Resident. Common, but not abundant. Specimens were taken in August, September, October and December.

*Bubo virginianus occidentalis*. Horned Owl. Resident. A nest containing one small young was first seen on April 3, 1942. Food items found in Horned Owl pellets picked up near this young owl consisted of ground squirrels, pocket gophers, meadow mice, cottontail rabbits, California Quail and one Jerusalem cricket (Alcorn, 1942c:284-285).

*Speotyto cunicularia hypugaea*. Burrowing Owl. Common summer resident. Recorded each month from March to October.

*Asio wilsonianus*. Long-eared Owl. Resident. Most records are for March, April and May. Nests containing eggs were noted on March 31, 1936, and April 4, 1939.

*Asio flammeus flammeus*. Short-eared Owl. Winter visitant. Seen frequently from September to February, inclusive. Also seen on July 5, 1941.

*Cryptoglaux acadica acadica*. Saw-whet Owl. Specimens were obtained in January, 1937, and December, 1935 (Alcorn, 1940: 170). One was seen on September 10, 1939, and one on November 27, 1939, by Mills.

*Chordeiles minor hesperis*. Booming Nighthawk. Summer resident. Abundant from the latter part of May to the middle of September.

*Phalaenoptilus nuttallii nuttallii*. Poor-will. Summer visitant; not common. One was heard on May 15, 1941. Other individuals were seen in July, August, September and October.

*Selasphorus rufus*. Rufous Hummingbird. Transient. Not numerous. Two were obtained on August 7, 1939.

*Megaceryle alcyon caurina*. Belted Kingfisher. Resident. Seen frequently throughout the year.

*Colaptes cafer collaris*. Red-shafted Flicker. Resident; many records are available for each month.

*Asyndesmus lewis*. Lewis Woodpecker. Transient; seen in May, August, September and October. Not numerous.

*Sphyrapicus varius nuchalis*. Yellow-bellied Sapsucker. One specimen was taken on April 23, 1941. This is the only record for this area.

*Dryobates villosus orius*. Hairy Woodpecker. One was obtained on November 11, 1939. No other records are available.

*Dryobates pubescens*. Downy Woodpecker. The race *D. p. leucurus* is a transient. One was obtained on December 25, 1941.

The race *D. p. turati* is resident. Present in limited numbers throughout the year. One was taken on December 12, 1940. An adult judged to belong to this race was seen carrying food to a nest containing young, in June, 1944.

*Tyrannus verticalis*. Western Kingbird. Summer resident. Seen frequently from the latter part of April through August. Also seen on September 4 and 7, 1943. A nest containing 4 eggs was noted on June 14, 1941.

*Myiarchus cinerascens cinerascens*. Ash-throated Flycatcher. Summer resident; frequently seen in May, June, July and August.

*Sayornis nigricans semiatra*. Black Phoebe. One taken on February 11, 1945.

*Sayornis saya saya*. Say Phoebe. Resident; not abundant, most frequently seen in March. Recorded in all months except October.

*Empidonax traillii brewsteri*. Traill Flycatcher. Migrant. One specimen was taken on August 26, 1940. No other definite records are available.

*Empidonax hammondi*. Hammond Flycatcher. Linsdale (1936:77) reports examining a specimen in the United States National Museum that was taken 4 miles west of Fallon on May 13, 1925.

*Empidonax wrightii*. Wright Flycatcher. One was obtained on August 11, 1941, and another on May 30, 1942.

*Empidonax griseus*. Gray Flycatcher. One was taken on May 2, 1942.

*Myiochanes richardsonii richardsonii*. Western Wood Pewee. Summer resident. Specimens were taken on May 30, 1942, and on August 19, 1941.

*Nuttallornis borealis*. Olive-sided Flycatcher. One specimen was taken by Mills on May 30, 1942.

*Otocoris alpestris*. Horned Lark. *O. a. utahensis* is a winter visitant. Three specimens were taken on January 3, 1942. Behle (1942: 241) examined 18 specimens of this race that were taken 10 miles south of Fallon.

The race *O. a. lamprochroa* is resident. Linsdale (1936:80) reports specimens and eggs taken 7 miles north of Stillwater on May 20, 1934. Also two were taken 10 miles south of Fallon on September 30, 1934.

*Tachycineta thalassina lepida*. Violet-green Swallow. Possibly summer resident; seen frequently in April and May. Recorded on one occasion in June and a lone individual was seen in November.

*Iridoprocne bicolor*. Tree Swallow. Summer resident. Recorded in February, March, April, May and August.

*Riparia riparia riparia*. Bank Swallow. Summer resident. Frequently seen in May, June, July and August. They regularly nest at the north end of Soda Lake.

*Stelgidopteryx ruficollis serripennis*. Rough-winged Swallow. Possibly summer resident. Frequently seen in April and May. Also recorded twice in June and on March 28, 1941.

*Hirundo rustica erythrogaster*. Barn Swallow. Summer resident; seen frequently in all months from April to September, inclusive. Also recorded in October on two occasions and twice in March. Linsdale (1936: 82) reports that a nest containing 5 eggs was taken 10 miles north of Stillwater on May 20, 1934.

*Petrochelidon albigularis albigularis*. Cliff Swallow. Summer resident. Two taken at Soda Lake on April 28, 1942, belonged to this race. Birds belonging to this species were frequently seen each month from the latter part of April through July. Also recorded on September 3, 1941. These birds regularly nest at Lahontan Dam.

*Aphelocoma californica woodhousei*. California Jay. Winter visitant; not abundant. Individuals were seen in each month from September 30 through April.

*Pica pica hudsonia*. Black-billed Magpie. Resident; common and widespread over the whole area. Nineteen nests containing eggs or young birds were seen on May 12, 1936.

*Corvus corax sinuatus*. Holarctic Raven. Resident; recorded frequently. A nest, located in a cottonwood tree, and containing 4 young, was seen on May 18, 1939.

*Corvus brachyrhynchos hesperis*. American Crow. Resident. A nest containing 6 eggs was seen on April 4, 1939, and another nest containing 3 young birds was seen on May 24, 1939.

*Cyanocephalus cyanocephalus*. Piñon Jay. Transient; not common. Observed in flight in May, September and October. Those seen were usually in small flocks.

*Parus gambeli*. Mountain Chickadee. Recorded in each month from October to March, inclusive. Two specimens, collected on October 31, 1940, and April 16, 1945, respectively, proved to belong to the race *abbreviatus*.

*Saltriparus minimus plumbeus*. Bush-tit. Resident; not abundant. Seen most often in April and May. This bird may nest along the Carson River north of Fallon. Recorded less often in January, February, June, October, November and December. One was obtained on January 1, 1941.

*Sitta canadensis*. Red-breasted Nuthatch. Transient. Individuals were seen on August 18, 1942, on September 5 and 27, 1942, and on June 1, 1943. One was obtained on August 25, 1942.

*Cinclus mexicanus unicolor*. American Dipper. One was obtained by Mills on November 26, 1939. No others have been seen.

*Troglodytes aedon parkmanii*. House Wren. Linsdale (1936: 91) records this wren at Stillwater. No others have been detected.

*Troglodytes troglodytes pacificus*. Winter Wren. A solitary bird was taken 4 miles west of Fallon on April 5, 1939 (Alcorn 1940: 170).

*Thryomanes bewickii atrestus*. Bewick Wren. Resident; not abundant. Recorded in all months of the year except January and May. Specimens were taken on March 3, June 3 and June 22 (Miller, 1941: 250-251).

*Temnodactylus palustris plesius*. Long-billed Marsh Wren. Resident; abundant in marshy areas. Recorded in all months except February and September.

*Salpinctes obsoletus obsoletus*. Rock Wren. Linsdale (1936: 93) recorded this wren at Stillwater. Although common in the foothills surrounding this area, none was seen in the valley by Alcorn or Mills.

*Mimus polyglottos leucopterus*. Mockingbird. Resident. Present in limited numbers. Individual birds recorded from August through May.

*Oreoscoptes montanus*. Sage Thrasher. Summer resident; not common. Seen in each month, except August, from March to October, inclusive.

*Turdus migratorius propinquus*. Robin. Resident; abundant in summer, less numerous in winter. Nests containing eggs were seen on April 26 and May 16, 1942.

*Ixoreus naevius meruloides*. Varied Thrush. Seen in October and November. Specimens were taken on November 3, 1940, and on December 29, 1940 (Alcorn, 1941a:119).

*Hylocichla guttata nanus*. Hermit Thrush. One was taken by Mills on January 6, 1943. No others have been seen.

*Sialia mexicana occidentalis*. Mexican Bluebird. Resident; not abundant. Seen in all months except June, July and November.

*Sialia currucoides*. Mountain Bluebird. Winter visitant. Repeatedly seen in November, December and January. Less often recorded in February and March.

*Myadestes townsendi townsendi*. Townsend Solitaire. Winter visitant. Recorded in January, February, September, October and November.

*Polioptila caerulea amoenissima*. Blue-gray Gnatcatcher. One was obtained on April 27, 1942. No others have been seen.

*Regulus calendula cinereus*. Ruby-crowned Kinglet. Winter resident. Seen or obtained in each month except June, July and August.

*Anthus spinoletta pacificus*. Water Pipit. Winter resident. Recorded frequently from October to April, inclusive.

*Bombicilla garrula pallidiceps*. Bohemian Waxwing. A small flock was seen and one individual was taken on January 29, 1942.

*Bombicilla cedrorum*. Cedar Waxwing. Irregular visitant. Seen most frequently in September, October, November and December. Less often recorded in January, May and June.

*Phainopepla nitens lepida*. Phainopepla. A lone individual was seen in August, 1943. One was shot on October 11, 1943, by Mills 3½ miles west-southwest of Fallon.

*Lanius excubitor invidiosus*. Boreal Shrike. Winter visitant in limited numbers. Seen in December and January. One was taken on January 13, 1941.

*Lanius ludovicianus*. Loggerhead Shrike. The race *gambeli* is a winter visitant. Specimens were taken in October and November.

The race *L. l. nevadensis* is resident and has been recorded frequently. Specimens were taken in October and November.

*Vireo gilvus*. Warbling Vireo. One lone individual of the race *leucopolius* was taken on May 21, 1942.

The race *V. g. swainsonii* is possibly a summer resident. One was taken on September 14, 1942. Other vireos, lone individuals, were seen in summer months.

*Vermivora celata*. Orange-crowned Warbler. The race *V. c. celata* is a scarce winter visitant. Specimens were taken in September and on November 29, 1940.

An example of the race *V. c. orestera* was taken on September 6, 1942.

*Dendroica aestiva morcomi*. Yellow Warbler. Summer resident; common. One was taken on July 28, 1941. Seen frequently from May to August, inclusive.

*Dendroica auduboni auduboni*. Audubon Warbler. Winter visitant. Recorded in each month except February, June, July and August. Most numerous in winter months.

*Seiurus auroparillus*. Oven-bird. On June 12, 1941, one of these birds was found dead 4 miles west of Fallon (Alcorn, 1941b:294).

*Oporornis tolmiei*. Tolmie Warbler. Transient. Specimens were obtained on May 21 and on May 25, 1942. Also seen on three occasions in August, 1941.

*Geothlypis trichas occidentalis*. Yellow-throat. Summer resident. Numerous records available from April 28 through August.

*Icteria virens auricollis*. Chat. Summer resident. Seen frequently from May to August, inclusive.

*Wilsonia pusilla pileolata*. Pileolated Warbler. Several were seen and one was taken on May 30, 1942.

*Passer domesticus*. English Sparrow. Resident; abundant. Recorded frequently.

*Sturnella neglecta*. Western Meadowlark. Resident. Less widespread in winter than in summer. Recorded on more than ten days of each month. Nests containing eggs were seen on May 11, 1941, and on April 27, 1942.

*Xanthocephalus xanthocephalus*. Yellow-headed Blackbird. Summer resident and transient. Widespread and abundant. Recorded each year from April to August, inclusive. Occasionally seen in all other months except February.

*Agelaius phoeniceus nevadensis*. Red-winged Blackbird. Resident; small groups scattered in

summer over much of the area; in winter large flocks seen only in favored localities. Recorded in each month, most frequent in spring and summer. A nest containing 3 small young was seen on June 1, 1941.

*Icterus bullockii*. Bullock Oriole. Summer resident. Seen repeatedly each month from April 24 to August 19.

*Euphagus cyanocephalus*. Brewer Blackbird. Resident; most widely distributed in spring and summer months. In winter seen most frequently in large flocks.

*Quiscalus quiscula*. Purple Crackle. One was found dead 4 miles west of Fallon on April 14, 1938. It had apparently been killed with strychnine poisoned rolled oats that were distributed in the area for ground squirrels (Alcorn, 1940: 170). No others have been seen.

*Molothrus ater artemisiae*. Brown-headed Cowbird. Summer resident. Seen frequently in April, May, June and July of each year.

*Piranga ludoviciana*. Western Tanager. Summer resident. Seen in each month from May to September, inclusive.

*Hedymeles melanocephalus melanocephalus*. Black-headed Grosbeak. Summer resident. Seen in May, June, July and August. One was taken on May 29, 1941. An adult was seen to fly from a nest containing 4 eggs on May 30, 1945.

*Passerina amoena*. Lazuli Bunting. Summer resident. Recorded in June, July and September. One was taken on September 4, 1941.

*Hesperiphona vespertina brooksi*. Evening Grosbeak. One was taken on November 26, 1944.

*Carduelis mexicanus frontalis*. House Finch. Resident; recorded on numerous occasions.

*Spinus tristis pallidus*. American Goldfinch. Specimens were taken on November 22, 1939, November 5, 1940, December 26, 1940, and May 17, 1942. Goldfinches of this species were recorded frequently from October to June, inclusive. Also seen twice in August. Most frequently recorded in April. They were seen on eleven different days in April, 1941.

*Spinus psaltria hesperophilus*. Arkansas Goldfinch. One was taken on February 5, 1944.

*Loxia curvirostra bendirei*. Red Crossbill. Linsdale (1936: 121) reported that these birds were seen and specimens taken by Anna Bailey Mills on July 18, 1919. No other records are available.

*Pipilo maculatus curvatus*. Spotted Towhee. Resident; not numerous. Seen in each month of the year. One was taken on June 20, 1940.

*Passerculus sandwichensis nevadensis*. Savannah Sparrow. Resident. Specimens were taken on November 2, 1940, and on January 23, 1941. Seen in February, March, May, June and July.

*Chondestes grammacus strigatus*. Lark Sparrow. One of two seen was taken on May 3, 1941. No other records are available.

*Amphispiza bilineata deserticola*. Black-throated Sparrow. Summer resident. One was obtained on April 20, 1942. Recorded by Linsdale (1936: 125) from Stillwater. Seen by Mills on May 24 and June 7, 1942.

*Amphispiza belli nevadensis*. Bell Sparrow. Resident. Specimens were taken on October 30, 1940, and on January 2, 1942. Others were seen in February, April, October, November and December.

*Junco hyemalis cismontanus*. Slate-colored Junco. One was taken on December 26, 1940. No others have been recognized.

*Junco oreganus*. Oregon Junco. Two *J. o. montanus* were taken on November 20, 1942.

An example of *J. o. shufeldti* was obtained on March 16, 1945.

Juncos (of all races) were seen frequently each month from September to April, inclusive.

*Spizella arborea ochracea*. Tree Sparrow. One was taken on November 25, 1939 (Alcorn, 1940: 170). No others have been seen.

*Spizella passerina arizonae*. Chipping Sparrow. Specimens were obtained on July 30 and September 21, 1941. No others have been recognized.

*Spizella breweri breweri*. Brewer Sparrow. Specimens were taken on August 22 and September 4, 1941. Recorded by Linsdale (1936: 129) from Old River, near Carson Sink and from Stillwater and Fallon.

*Zonotrichia leucophrys gambelii*. White-crowned Sparrow. Winter visitant; abundant. Seen frequently in all winter months from September to April, inclusive. Also seen on two occasions in May. Specimens were taken on September 30, 1939.

*Zonotrichia coronata*. Golden-crowned Sparrow. A lone individual was obtained on April 30, 1936 (Alcorn, 1940: 170).

*Passerella iliaca schistacea*. Fox Sparrow. One was taken on April 23, 1941. Fox Sparrows of undetermined race were seen by Mills on March 29, 1942.

*Melospiza lincolnii lincolnii*. Lincoln Sparrow. Specimens were obtained on March 25 and September 4, 1941, and on September 12, 1942. No others have been recognized.

*Melospiza melodia*. Song Sparrow. The race *M. m. montana* is a winter visitant. Specimens were taken on September 30, November 14, 22, 25, December 6, 1939, and on October 22, 1940.

The race *M. m. fisherella* is resident. Specimens were taken on November 22 and December 14, 1939, and on March 2, 1941. Numerous song sparrows, judged to be breeding birds, were seen in spring and summer months north of Stillwater.

The race *M. m. merrilli* is a transient. Specimens were obtained on November 14, 1939, and March 2, 1941.

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*United States Fish and Wildlife Service, Fallon, Nevada, November 20, 1945.*



## FROM FIELD AND STUDY

**The Emperor Goose on Carmel Bay, California.**—On December 29, 1945, I saw an Emperor Goose (*Philacte canagica*) standing on a low rock (a part of Pescadero Rock of the U.S.G.S. maps) at the north end of Carmel Bay, California. The bird was squatting and preening and, although at long range, it afforded an excellent opportunity in good light to observe, with the aid of a prismatic telescope, the white head and hind-neck, the black throat, the "scaled" upperparts, and the yellow legs.

The presence of this bird in the region was first brought to my attention by Mrs. Wilma Cook, of Carmel, who first saw it on the beach at Carmel on December 28. At that time it was standing among some Heermann Gulls (*Larus heermanni*) and allowed Mrs. Cook to approach closely. The bird was noted by the members of the Monterey Peninsula Audubon Society, including the writer, at the time of the Christmas bird count for Audubon Magazine on December 30.

On January 8, 1946, the goose was seen again, but this time on the water. It was observed pecking vigorously at the tubes and heads of slimy kelp floating on the water. After half an hour it took off, flew low over the water for 300 yards with rapid beats of its somewhat short wings and re-alighted among other growing kelp heads.

On January 11 the goose was once more located on Pescadero Rock. This time there were five Brant (*Branta bernicla*) on the rock also. The Brant were nibbling at marine vegetation exposed by the low tide, but the goose remained in a sleeping posture. Soon the Brant took flight to the water and browsed at kelp heads as the Emperor Goose had on January 8. I could see the Brant pulling off stringy bits of the growth. After a while the Emperor Goose walked down the rock among some Glaucous-winged Gulls (*Larus glaucescens*) which gave way at its approach. The goose disappeared behind a rise of rock and was rediscovered 22 minutes later preening on another part of the rock while the Brant continued to feed, not far away.

In "The Distributional List of the Birds of California" (Pac. Coast Avif. No. 27, 1944:69), Grinnell and Miller give the geographic range of the Emperor Goose in California as "Northwest coastline and great valleys south to Merced County" and cite a record by Bryant for December, 1912, at Ingomar. The present record would then seem to be the most southerly definite occurrence for the species in the state. The salt water habitat in which I found the bird is of interest also as Grinnell and Miller state (*op. cit.*:70): "Occurrences here [in the state] chiefly in fresh-water areas, and where also winter most of our other geese, those which are non-maritime. This is surprising, because the Emperor Goose in its main wintering area far to the northwest appears to be restricted almost exclusively to the salt-water littoral. However, a fair number has been reported from maritime habitat at Humboldt Bay." —LAIDLAW WILLIAMS, Carmel, California, February 20, 1946.

**Indigo Buntings Breeding in Arizona.**—Although there have been several records of the Indigo Bunting (*Passerina cyanea*) in Arizona, the birds have generally been considered to be casual visitors. The normal range is, of course, far to the east. At the western edge of this range, on the plains, occasional hybrids with the Lazuli Bunting (*Passerina amoena*) have been reported. It was thus quite unexpected to find evidence that the Indigo Bunting was breeding, apparently in pure strain, in north-central Arizona.

We observed Indigo Buntings at Manzanita Forestry Camp in Oak Creek Canyon, 26 miles south of Flagstaff on U.S. highway alternate 89, from July 4 to August 8, 1944. They were found in an apple orchard on one side of the road and in native trees and shrubs along the road. The trees here are yellow and piñon pines, four species of oaks, smooth cypress, three species of juniper, and an alder; a hundred feet below, along the creek, are willows and aspens. The shrubs include *Ceanothus*, scrub oak, sumac, and two species of manzanita.

We first saw an Indigo Bunting on July 4, when a male was noted singing from a juniper, at a bench mark elevation of 4875 feet. Later we saw this bird whenever we were in that vicinity; usually it sang from a conspicuous bough of an apple tree near the road. With field glasses we easily made out the purplish blue head and throat, lighter blue body, black lores and tail, and solidly dark wings, without wing bars. There was a Lazuli Bunting a short distance upstream, and the two could not be confused. We are also familiar with the Blue Grosbeak (*Guiraca caerulea*), which we saw daily near Prescott, Arizona, from May 11 to 22, 1944.

The female Indigo Bunting was not seen until July 23, when the young came off the nest. The nest was not seen, but the fuzzy brownish fledglings appeared that morning, and both parents were much excited about them. The male hopped excitedly about one of the fledglings on a low branch of a walnut tree near us. The female fed a second fledgling in a near-by shrub. Another was discovered low in an apple tree. We watched it sit perfectly still for more than twenty minutes, and we wondered

how the parents would find it. Without a sound from parent or fledgling, the female flew straight to the latter, fed it, and flew away. The fledgling remained in its place. The female was olive brown above, lighter and lightly streaked below. Her wings and tail were faintly tinged with blue. She had no wing bars. The young resembled the female, but were brighter brown with short tails.

On July 24, we saw the parents together carrying food to three or four young in an alder tree near the road. The next day the family was still in the alders. The male, with a green caterpillar in his beak, flew from the orchard and fed a young bird. We saw the male again on August 1 and nearly every day after that until August 8. He often sang on the wing. Although we visited the locality almost every day until early September, we did not see the buntings after August 8.—H. DEARING and M. DEARING, Tucson, Arizona, January 25, 1946.

**Notes on the Purple Martin Roost at Tucson, Arizona.**—Roosting behavior of the Purple Martin (*Progne subis*) during the summer and fall of 1943, at Tucson, Arizona, was described by Cater (Condor, 46, 1944:15-18). A careful check of our own notes of the past fourteen years and additional data which we gathered in 1945 reveal that considerable change occurs occasionally in the roost location. Cater reported one such change in 1943, a shift of  $1\frac{1}{2}$  miles to the north from the earlier roost.

Our home on Kleindale Road, northeast of Tucson, has been directly in the path of the general evening flight of the martins. In the year 1932 the flight was westward. In 1933 the martins gathered at dusk near Binghamton Pond,  $1\frac{1}{2}$  miles east of us, and about 6 miles east of the Santa Cruz River roost of 1943. Presumably they roosted in the vicinity of this pond. Then from 1934 to 1944 the flight was again to the west. (No data are available for 1936, and only the date of first observation was recorded for 1939.)

Apparently, gregarious roosting takes place as soon as the migrants arrive from the south. All martins seen flying by in the evenings in the spring, summer and fall have been in groups of more than two. While we did not obtain exact spring arrival dates, we did record the first evening flights past our home. These range from May 3, in 1940 (also our earliest arrival date), to May 15, in 1938. Probably the average arrival occurs in the first week of May in the Tucson region.

In 1945 the martins were first seen flying west on May 13. We visited the Santa Cruz River area on June 21 and saw perhaps 1000 birds fly to a roost in the cottonwoods at a golf course reservoir. By the first part of August, however, the evening flight reversed to the east. Martins soon began resting on the electric wires in our neighborhood. As many as 1000 were counted on August 25. On August 26 we discovered the roost about one-half mile southeast of our home. It was again in a grove of cottonwoods, but about five miles east of the Santa Cruz River golf course roost.

Evidently the roost consisted only of martins. No other species was noted flying into the trees. However, on September 18, while we watched the martins' coming in from the northwest over our house, we discovered a Vaux Swift (*Chaetura vauxi*) flying with them. We drove to the roost at once, hoping to locate it again. Scanning the swarm of martins carefully, we finally picked out one or two swifts that kept pace with the rapidly moving circle of birds. Frequently we lost them in the whirling mass overhead. Then, at dusk when the last group of martins flew into the cottonwoods, we suddenly saw five swifts above the trees. They seemed to hesitate a moment, then they took off quickly to the northeast in the direction of the Santa Catalina Mountains, 5 miles away.

In the fall of 1945 there was no general assembly point used by the martins before going to roost. Therefore, we could not estimate accurately the total number. We guessed there were at last 10,000. Those coming from the west and northwest gathered on wires near our home; others, about 2000, flying in from the east were noted one evening on wires a mile to the southeast. Still others flew directly into the swarm above the roost. As the density increased, martins could be seen approaching from the northwest, west, south and east, but not from the north.

In contrast to their behavior in 1943, the martins took much longer to go to roost. At first only a few, 10 or 15 perhaps, appeared above the cottonwoods. These flew without apparent definite order in the area above the roost. Then when one or two hundred arrived, the group began a circular motion which continued as hundreds and thousands more joined it. The motion was chiefly counter clockwise, but when the group strayed off the beat it would sometimes change to clockwise. This often left a straggling, curving tail to the flock, which, in straightening out, resembled the rapid movement of a long "cracked" whip. As dusk approached, this flat horizontal circular swarm of chirping birds gradually settled lower. Soon the leading part of the group poured downward into the top of a cottonwood tree. Often the velocity was so great that the martins piled up on the near side of the tree. Then they rose over the top like a wave, and passed on, drawing some if not most of the first settlers away into the group again. Another circle, then more would detach themselves and disappear into the upper part of the tree. Sometimes three or four distinct groups would each dive in, one after the other. Between each descent the remainder of the flock continued its rapid circular motion just above the trees.

At this later stage, when the "cracking-of-the-whip" maneuver sometimes occurred, the birds often roared through the adjacent telephone and electric power wires, now and then only five feet above the ground. It was remarkable that widespread injuries did not result from collision. Once, as the group streamed past, a martin suddenly darted up from the weeds near-by and joined the flight. It had apparently been stunned and then revived. At another time we found one lying dazed in a road a mile southeast of the roost, where preliminary assembly on electric wires was under way. It did not move when we picked it up; no injury was visible. By this time the martins began to take off for the roost so we drove over, carrying the stunned bird with us. In a few minutes the bird began to struggle and when we reached the vicinity of the roost it squealed loudly in its efforts to escape. We then opened the car window and released it. Immediately the martin flew upward into the whirling flock above the cottonwood trees. Occasionally we found a dead martin beneath the early assembly points.

Group division within the total mass at the roost was evident throughout the fall. The martins arrived in fairly definite groups from different directions. They descended into the roosting tree by groups. Likewise the departure for the south was by groups. After September 30 the number of martins diminished each night and on October 11 only five appeared. None was seen after that date.

Finally it might be emphasized that so far as our observations go, the preliminary evening assembly, when it occurs, has always been upon electric wires. The first military telegraph line reached Tucson in 1873, and it was years later before electric light and power lines were constructed. Previous to this, did the martins gather in trees before going to roost in other trees? Or did they fly directly to their roost?—A. H. ANDERSON and ANNE ANDERSON, *Tucson, Arizona, February 23, 1946.*

**An Unusual Nest of the White-throated Swift.**—While collecting near Shandon, Kern County, California, in the latter part of May, 1945, a nest of the White-throated Swift (*Aeronautes*



Fig. 27. White-throated Swift's nest built on old nest containing dead swift.

*saxatilis*) was taken by my companion, Mr. L. T. Stevens. This nest, which contained five fresh eggs, was built on an old nest which contained a dead swift. The bird had probably died on the nest the year previously, as it was mummified. Figure 27 shows the new nest with the bird protruding from beneath it.—E. Z. RETT, *Santa Barbara Museum of Natural History, Santa Barbara, California, March 13, 1946.*

**The American Redstart in Southern Nevada.**—On the morning of May 21, 1942, I saw an American Redstart (*Setophaga ruticilla*) on the desert about nine miles northeast of Las Vegas, Clark

County, Nevada. This locality is part of an arid, intermontane valley in the Lower Sonoran Zone. I watched the bird through 8-power binoculars at a range of 20 to 30 feet for nearly half an hour as it fed on insects in a fifteen-foot flowering mesquite. The color of the plumage was that of a female or immature male. This was the only redstart I observed while stationed at the army airfield near Las Vegas in the two-year period from October, 1941, to October, 1943.

To my knowledge there are only two other records of the American Redstart in Nevada: a skin collected May 30, 1928, at Fish Lake, Esmeralda County (Linsdale, Pac. Coast Avif. No. 23, 1936:111), and a sight record of one at Boulder City, Clark County, on August 25 and 29, 1939 (Graeter, Prelim. Bird Check-list of the Boulder Dam Recreational Area, U. S. Dept. Interior, Nat. Park Serv., 1939: supplemental list). The species apparently occurs in Nevada only as a migrant. The nearest locality at which it is known to breed and remain as a summer resident (early June to late September) is northern Utah (Ross, Condor, 46, 1944:129).—HAROLD E. BROADBOOKS, *Museum of Zoology, University of Michigan, Ann Arbor, Michigan, March 21, 1946.*

**People in Glass Houses Should Draw Their Shades.**—In a recent issue of the Condor (1945:216) there is a posthumous field note by George Willett, wherein he comments on the large number of Russet-backed Thrushes (*Hylocichla ustulata ustulata*) killed by flying against windows. He titles the article with a query—"Does the Russet-backed Thrush Have Defective Eyesight?" The explanation of fatality incidence, it seems to me, lies not in defective eyesight but rather in habits of tunnel flight and inexperience with passages to light that are blocked to flight by window glass.

It is well known that this species migrates in the lowlands, frequenting en route its typical association—the woodlands of moist ground and streamside. Its use of environments of human culture, the heavy verdure of gardens and yards, is less well known and is here indicated by the fatalities. In my twenty-five years of residence in Pasadena, California, the spring influx of Russet-backs has been clearly but briefly noted. The overwintering Hermits leave the dooryards in April; suddenly, of a later morning, thrushes possess the shaded thickets again; the migrating Russet-backs abound for a few days and are gone.

This spring, when the Russet-backs stopped by, well-rotted compost-like wood-soil was being dug from a pit and spread as a dressing beneath shrubbery. Each barrow load dumped was promptly searched over by one or more thrushes that stayed about. The birds alternated between the pit and the dumpings as I drove them from first one and the other. Some of the time they flitted low into the neighbor's yard and back. Never in all this driving about did the migrants go up in the trees as do the wintering Hermits when disturbed, never except when cornered by buildings.

This low flight through the understory of plantings is characteristic within the native habitat which locally consists of riparian woodland and farther north of other moist sylvan growths. This shadowy humid world of rich soil and rapidly decaying ground litter has climate, flora and fauna unique to itself. The Russet-backed Thrush has here its niche. Even in migration underplanted trees, moist soil, dense humid shade, and compost are irresistible. It is in this gallery habit rather than in defective eyesight that I readily see the cause of the high fatality. Willett recorded during the migrating season. Shooting through the underforest the newly arrived traveler follows an aisleway leading out to light. When too late the aisle is recognized as a *direct view* through a house and not a direct flight path, there remains but a slight clatter and a small limp body to record an error of ecology.

The Chat and the Yellow-billed Cuckoo affect the same natural habitat as the Russet-backed Thrush and fly through the same galleries and tunnelways. All three migrate, yet only the thrush becomes a significant casualty about human dwellings. This seems to be explained by the thrush's acceptance of sylvan bosky haunts besides the riparian. The other two stick to the willows and brambles.—ROLAND CASE ROSS, *Los Angeles City Schools, California, December 17, 1945.*

**A Summer Tanager near San Diego, California.**—On the morning of April 1, 1943, Dr. James E. Crouch, eight students in his zoology class, and I saw an adult male Summer Tanager (*Piranga rubra*) at Lindo Lake, about 17 miles northeast of San Diego, California. This bird, while under observation for a half-hour period, was foraging in the peripheral foliage of the willows bordering the lake. Frequent single call notes were uttered as it moved about ten to fifteen feet above ground.—HENRY G. WESTON, JR., *Museum of Vertebrate Zoology, Berkeley, California, March 20, 1946.*

**The Starling in Idaho.**—I believe there is no printed record of the observation of the Starling (*Sturnus vulgaris*) in Idaho. An unpublished master's thesis at the University of Idaho, Moscow, "A Preliminary Check-list of the Birds of Northern Idaho," by Clarence Olsen, Jr., lists a single observation of this species. This individual was seen one mile east of Moscow, Latah County, Idaho, on December 13, 1941.

On January 15, 1946, Leonard Webster, Pocatello, Idaho, reported the observation of a flock of

about fifty Starlings near Aberdeen, Bingham County, Idaho. Later in the month the same number of birds was seen ten miles north of Pocatello, Bannock County.

By the end of February, this flock had increased to several hundred, according to the observation of several individuals. On February 17, 1946, these men (Harold Webster, John R. Nichols, Carl McIntosh, and the writer) collected a female and a male from this flock. These are now a part of the collection at the Southern Branch of the University of Idaho, Pocatello (numbers 543 and 544).—VICTOR E. JONES, *University of Idaho, Pocatello, Idaho, February 27, 1946.*

**"Tumbling" of Brant.**—From 1892 until about 1900, I was a frequent visitor to the Coronado Strand at San Diego. At that time it was a common sight to see strings of Brant flying north and rising at a very slight angle. Suddenly the leader would tumble vertically about 20 to 30 feet, followed at the same spot individually by each succeeding member of the string which would then again begin the almost imperceptible climb for another tumble. The tumbles were made at intervals of about a mile. In those days there were many strings visible at the same time. There were no V-shaped flock formations. Was this a "game," courting, or a regular migrational phenomenon?—CHAPMAN GRANT, *San Diego, California, March 11, 1946.*

**The Starling Taken in the State of Washington.**—Several sight records and unconfirmed occurrences of the Starling have been reported in the state of Washington in the past few years. At least one such report was based on misidentification; the alleged Starling when shot proved to be a female red-winged blackbird! However, Joe Drolet, District Game Supervisor of Colfax, Washington, shot two Starlings about three miles northwest of Colton, Whitman County, Washington, on March 3, 1946. These two birds, both males, were examined by me two days after they were shot. There is no question as to their identity, both being adult *Sturnus vulgaris* in full spring plumage. So far as I am aware, this is the first time this species has actually been collected in the state of Washington.—STANLEY G. JEWETT, *Portland, Oregon, March 6, 1946.*

**Eye-witness Account of Golden Eagle Killing Calf.**—Fred Houk is a cattleman of many years experience in the Lompoc area, California. I describe the following experience as he told it to me.

On November 23, 1945, Mr. Houk was riding across some hilly, grassy range land about two miles east of Lompoc, Santa Barbara County, California. He noticed the excitement of some crows whose point of interest was just over a rise. Riding to the crest he expected to see a wildcat or a coyote. Instead a Golden Eagle (*Aquila chrysaetos*) was the focus of attention. It was perched on something in the tall grass about 150 yards from him. He presumed it to have a rabbit or squirrel. Upon approaching the eagle it started to fly, attempting to carry its prey in its talons. Mr. Houk saw that the eagle's prey was a calf and found it to be near death and bleeding considerably about the back and head.

The calf was new-born, probably premature, and was estimated by Mr. Houk to weigh about twenty-five pounds. The parent cow was standing off some distance and appeared to be considerably disturbed; Mr. Houk believed it had been driven from the calf by the attacking eagle. From his observation of the eagle's attempt to carry off the calf he firmly believes that the eagle would have made away with the calf had it weighed five pounds less. This occurred on ground only slightly sloping.

On November 25, an eagle (presumed to be the same bird) was shot by a quail hunter near the same place. It weighed 11½ pounds, and its wing spread was measured as 6½ feet.—DALE T. WOOD, *Lompoc, California, March 12, 1946.*

**Black-billed Magpie on Humboldt Coast.**—While Warden Walter Gray and I were patrolling the north spit of Humboldt Bay on the morning of December 18, 1945, we noted a bird of peculiar appearance flying toward us. As it flew closer, we both recognized it to be a Black-billed Magpie (*Pica pica*), a bird entirely strange in the vicinity. It soon alighted on a pine snag, and we began a stalk in an endeavor to collect it. For forty-five minutes we trailed it, both on foot and by car, but the bird was quite wary and managed to keep out of range. One time we approached it with the car within twenty-five yards, close enough to note definitely that the bill was black, but it flew before we could stop for a shot. This time it really meant to leave, and the last glimpse we had was over the village of Samoa where it was heading north in a high steady flight.

The weather in the preceding three days had been characterized by steady winds, approaching gale velocity, from the east and southeast. This may have accounted for the magpie's appearance on the coast, 150 miles from its normal range, which lies east of the Cascade-Sierra system.

Both Warden Gray and myself are well acquainted with Black-billed and Yellow-billed magpies, having been stationed in the range of each at some time during our State service.—WILLIAM H. SHOLES, JR., *Arcata, California, January 24, 1946.*



## NOTES AND NEWS

It may interest some readers of the Condor to know that I have a contract with Dodd, Mead and Company, 432 Fourth Ave., New York 16, N.Y., to publish a reprint of my Bulletin 107, Life Histories of North American Diving Birds. It will probably appear some time next fall or winter. The price and the format will be announced by the publishers in due course. As the edition will be limited by the probable demand, it might be wise for those who lack this number to notify the publishers that they would like to have an opportunity to purchase a copy. If the demand seems to warrant it, some of the other rare numbers of this series may be reproduced.—A. C. BENT.

We learn with deep regret of the recent death of Milton S. Ray, a member of the Cooper Club since 1899.

## MINUTES OF COOPER CLUB MEETINGS

## NORTHERN DIVISION

FEBRUARY.—The monthly meeting of the Northern Division of the Cooper Ornithological Club was held on Thursday, February 28, at 8:00 p.m. in Room 2503 Life Sciences Building, University of California, Berkeley. President Sumner C. Brooks presided and about 35 members and guests attended.

The following were proposed for membership: Mary Carolyn Ramage, 2314 Marin Ave., Berkeley, Calif., Mr. Francis Clive Bett, 1620 Belmont Ave., Victoria, B.C., Canada, Rousseau Wm. Enderlin, Box 226, Auburn, Calif., Mrs. H. D. Langille, Edificio Ferreira, Hermosillo, Sonora, Mexico, Rollin H. Baker, Box 171, Eagle Lake, Texas, all by Alden H. Miller; Robert B. Finley, Jr., P. O. Box 36, Scotia, California, by Jean M. Linsdale.

A letter from Mr. C. V. Duff, chairman of the Endowment Committee, was read.

Mrs. J. W. Kelly reported a Red-breasted Nuthatch excavating a nest cavity in Golden Gate Park on February 13. On February 9 and 13 she saw a Yellow-shafted Flicker in Golden Gate Park and on February 26 she found three Bush-tit nests in Strawberry Canyon. Dr. Brooks reported Cinnamon Teal and Lutescent Warbler at Pacific Grove a week ago.

The speaker of the evening, Capt. Joe T. Marshall, Jr., reported on the birds of the Marianas and Palau islands.

Adjourned.—CHARLES G. SIBLEY, *Recording Secretary*.

MARCH.—The regular monthly meeting of the Northern Division of the Cooper Ornithological Club was held on March 28, 1946, at 8:00 p.m., in Room 2503 Life Sciences Building, University of California at Berkeley. President Sumner C. Brooks was in the chair and 45 members and guests were present.

Hugh P. Dearing, 912 Cacique St., Santa Barbara, California, was proposed for membership by Alden H. Miller, and Mr. Anthony Santos, 755 East 7th St., Chico, California, was proposed by Thomas L. Rodgers.

Field observations were opened by Mrs. Jory who invited members to view a Harris Sparrow which has been visiting her feeding tray at frequent intervals. Dr. Brooks reported a Black-throated Gray Warbler in Berkeley on March 25. Miss Verna Johnston of Stockton visited Corral Hollow on March 16 and reported the presence of several species including Golden Eagles, Raven, Western Kingbird, and White-throated Swift.

The speaker of the evening, Dr. T. Eric Reynolds, related some of the ornithological highlights of his travels during his tour of duty as a naval medical officer during the war.

Adjourned.—CHARLES G. SIBLEY, *Recording Secretary*.

## SOUTHERN DIVISION

MARCH.—The regular monthly meeting of the Southern Division of the Cooper Ornithological Club was held in Room 145, Allan Hancock Foundation, University of Southern California, Los Angeles, on Tuesday, March 26, 1946, at 8:00 p.m.; President Ed. M. Harrison presided, with about 50 members and guests present. The following names were proposed for membership: Harvey R. Cheesman, 535 E. Lomita St., Glendale 5, Calif., by Kenneth E. Stager; John Larsen, Jr., 3411 N. 26th Ave., Tacoma 7, Wash., by John McB. Robertson; Donald E. Payne, R.N., Palmer, Alaska, by Harold Michener; David B. Marshall, 1172 S. E. 55th Ave., Portland 15, Ore., and William H. Telfer, 607 S. E. Andover Pl., Portland 2, Ore., both by Stanley G. Jewett.

President Harrison appointed a committee consisting of Howard L. Cogswell, Chairman, W. A. Kent and Sidney L. Platford, to arrange details for the annual field day to be held on May 5.

Mr. Cogswell, speaker of the evening, described the flight, habits of feeding, and other behavior of oceanic birds he was able to observe from a transport while crossing the Pacific during the war.

Adjourned.—DOROTHY E. GRONER, *Secretary*.





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*For Sale, Exchange and Want Column.*—Each Cooper Club member is entitled to one advertising notice in any issue of *The Condor* free. Notices of over ten lines will be charged for at the rate of 15 cents per line. For this department, address JOHN MCB. ROBERTSON, Buena Park, California.

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FOR SALE—Check-list of the Birds of Nebraska, by Haeker, Moser and Swenk. Reprinted from *The Nebraska Bird Review*, vol. 13, May, 1945. Forty pages, heavy paper cover. Fifty cents per copy. —DR. R. ALLYN MOSER, *R. F. D. No. 1, Omaha 4, Nebraska*.

FOR SALE—Water color painting of white spotted setter, pointing, with brush background, by Louis A. Fuertes, 6½ × 11 inches, \$50.00. Oil painting of Harpy Eagle, by Charles Knight, 16 × 24 inches, \$75.00.—DR. A. K. FISHER, *Cosmos Club, Washington 5, D.C.*

FOR SALE—Music in Nature, four nonbreakable, 12 inch, phonograph records, seven sides recorded, by Loye H. Miller. An informal discussion of the five elements of music—time, tone, tune, timbre, touch—in relationship to bird songs and animal sounds. These sounds are reproduced by Professor Miller's own vocal and whistled imitations. Highlights are the four calls of the California Quail, the songs and cries of the creeper, wolf, screech owl, tree-frog, and meadowlark, and the amazing combination of tongue flutter, whistle, and grunt used to reproduce the sound of the Sandhill Crane. Four records for \$5.00.—UNIVERSITY OF CALIFORNIA PRESS, *Berkeley 4, California*.

FOR SALE—Life Histories of North American Birds, to highest bidder, set complete, except for first volume on diving birds. Also the following odd numbers at \$3.00 each; Bulletin 130, wildfowl, part 2; Bulletin 142, shorebirds, part 1; and Bulletin 146, shorebirds, part 2. These are less than dealers' prices.—A. C. BENT, *Taunton, Mass.*

FOR EXCHANGE—Bent's Life Histories of North American Birds, Bulletins 146, 162, 167, 174, 176 and 179 to exchange for Bulletins 107 and 126, or for volumes of Birds of North and Middle America. —L. B. HOWSLEY, *Brookings, Oregon*.

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#### IMPORTANT NOTICE!

If you received an extra copy of the November-December issue of *The Condor* for 1945, will you please return it to W. Lee Chambers, Topanga, California.

Through some error in our mailing department duplicate copies were mailed of the issue to an unknown number of members. It is very important that we keep our reserve stock up to average level, and we will certainly appreciate your cooperation in returning extra copies.

BUSINESS MANAGER'S OFFICE.

## PRICE LIST OF PUBLICATIONS ISSUED BY THE COOPER ORNITHOLOGICAL CLUB

In issuing this new list we have made many changes but have endeavored to price the items as low as is consistent with our limited editions and in accordance with a recent inventory. Many of our publications are now nearly depleted and some entirely sold out. All these publications are sent post paid anywhere in the United States; for sales in California please add 2½% sales tax on all items except the Condor magazine.

### THE CONDOR

- Vol. I (1899) "Bulletin of the Cooper Ornithological Club" - - - - - (Out of print)  
 Vols. II and III (1900-1901) The Condor - - - - - (Out of print)  
 Vols. IV to VII (1902-1905) The Condor, complete, each volume - - - - - \$10.00  
 Vols. VIII and IX (1906-1907) The Condor, complete, each volume - - - - - \$5.00  
 Vols. X and XI (1908-1909) The Condor, complete, each volume - - - - - \$3.00  
 Vol. XII (1910) The Condor, complete - - - - - \$5.00  
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 Vols. XXV to XXVII (1923-1925) The Condor, complete, each volume - - - - - \$7.00  
 Vols. XXVIII to XXXIII (1926-1930) The Condor, complete, each volume - - - - - \$5.00  
 Vols. XXXIII to 47 (1931-1945) The Condor, complete, each volume - - - - - \$3.00

### PACIFIC COAST AVIFAUNA

- No. 1, 1900 Birds of the Kotzebue Sound Region, Alaska; 80 pp., 1 map - - - - - \$1.00  
 By J. GRINNELL  
 No. 2, 1901 Land Birds of Santa Cruz County, California; 22 pp. - - - - - (Out of print)  
 By R. C. MCGREGOR  
 No. 3, 1902 Check-list of California Birds; 100 pp., 2 maps - - - - - (Out of print)  
 By J. GRINNELL  
 No. 4, 1904 Birds of the Huachuca Mountains, Arizona; 75 pp. - - - - - (Out of print)  
 By H. S. SWARTH  
 No. 5, 1909 A Bibliography of California Ornithology; 166 pp. - - - - - \$4.00  
 By J. GRINNELL  
 No. 6, 1909 Index to the Bulletin of the Cooper Ornithological Club, vol. I (1899), and its continuation, The Condor, vols. II to X (1900-1908); 48 pp. \$4.00  
 By HENRY B. KALDING  
 No. 7, 1912 Birds of the Pacific Slope of Southern California; 122 pp. - - - - - \$ .50  
 By G. WILLETT  
 No. 8, 1912 A Systematic List of the Birds of California; 23 pp. - - - - - \$ .25  
 By J. GRINNELL  
 No. 9, 1913 The Birds of the Fresno District; 114 pp. - - - - - \$ .50  
 By J. G. TYLER  
 No. 10, 1914 Distributional List of the Birds of Arizona; 135 pp., 1 map - - - - - \$1.00  
 By H. S. SWARTH  
 (With all orders for Avifauna 10, we include the supplement.)  
 Supplement to Pacific Coast Avifauna No. 10. The author, Anders H. Anderson, has brought this state list up to date. Reprint from The Condor, 36, March, 1934, pp. 78-83 - - - - - \$ .30  
 No. 11, 1915 A Distributional List of the Birds of California; 217 pp., 3 maps - - - - - \$1.00  
 By J. GRINNELL  
 No. 12, 1916 Birds of the Southern California Coastal Islands; 127 pp., 1 map - - - - - \$ .50  
 By A. B. HOWELL  
 No. 13, 1919 Second Ten Year Index to The Condor, volumes XI-XX (1909-1918); 92 pp. - - - - - \$2.00  
 By J. R. PEMBERTON  
 No. 14, 1921 The Birds of Montana; 194 pp., 35 illustrations - - - - - \$2.00  
 By AETAS A. SAUNDERS  
 No. 15, 1923 Birds Recorded from the Santa Rita Mountains in Southern Arizona; 60 pp., 4 illustrations. \$ .50  
 By FLORENCE MERRIAM BAILY  
 No. 16, 1924 Bibliography of California Ornithology; 2nd installment; 191 pp. - - - - - \$2.00  
 By J. GRINNELL  
 No. 17, 1925 A Distributional List of the Birds of British Columbia; 158 pp., colored frontispiece and map, 26 line maps, 12 ills. - - - - - \$1.50  
 By ALLAN BROOKS and HARRY S. SWARTH

- No. 18, 1927 Directory to the Bird-life of the San Francisco Bay Region; 160 pp., one map, colored frontispiece - - - - - \$1.50  
 By JOSEPH GRINNELL and MARGARET W. WYTHE  
 No. 19, 1929 Birds of the Portland Area, Oregon; 54 pp., 21 illustrations - - - - - \$ .50  
 By STANLEY G. JEWETT and IRA N. GABRIELSON  
 No. 20, 1931 Third Ten Year Index to The Condor, volumes XXI-XXX (1919-1928); 152 pp. - - - - - \$2.00  
 By G. WILLETT  
 No. 21, 1933 Revised List of the Birds of Southwestern California; 204 pp. - - - - - \$2.00  
 By G. WILLETT  
 No. 22, 1934 Birds of Nunivak Island, Alaska; 64 pp. - - - - - \$1.00  
 By H. S. SWARTH  
 No. 23, 1936 The Birds of Nevada; 145 pp. - - - - - \$2.00  
 By JEAN M. LINDALE  
 No. 24, 1936 The Birds of the Charleston Mountains, Nevada; 65 pp., 13 illustrations - - - - - \$1.00  
 By A. J. VAN ROSSEM  
 No. 25, 1937 The Natural History of Magpies; 234 pp., colored frontispiece. Bound with stiff paper cover, \$2.50  
 Bound in full velum cloth, \$3.50  
 By JEAN M. LINDALE  
 No. 26, 1939 Bibliography of California Ornithology; 3rd installment; 235 pp. - - - - - \$2.00  
 By J. GRINNELL  
 No. 27, 1944 The Distribution of the Birds of California; 608 pp., 57 distributional maps, colored frontispiece. Bound with stiff paper covers - - - - - \$6.00  
 Bound in strong buckram - - - - - \$7.00  
 By JOSEPH GRINNELL and ALDEN H. MILLER

### MISCELLANEOUS PUBLICATIONS

- Check-list of the Birds of Utah, by William H. Behle, reprinted from The Condor, March-April, 1944, Vol. 46, No. 2, pp. 67-87 - - - - - \$ .30

#### Biographies

- H. W. Henshaw; 56 pp., 3 pls. (from CONDOR, 1919-1920) - - - - - \$ .50  
 Robert Ridgway; 118 pp., 50 ills., with a complete bibliography of his writings (from CONDOR, 1928) - - - - - \$ .50

#### Bird Art Catalogues

- Catalogue of an exhibition of paintings by American Bird Artists, First Annual Meeting, Los Angeles Museum, April, 1926; 24 pp. - - - - - \$ .50  
 Catalogue of the work of Major Allan Brooks shown in connection with the Third Annual Meeting of the Cooper Ornithological Club, May 4-6, 1928, under the auspices of the San Diego Society of Natural History, Fine Arts Gallery, Balboa Park, San Diego, Calif.; 10 pp. - - - - - \$ .25  
 Catalogue of an exhibition of bird paintings by Lynn Bogue Hunt, sponsored by the Southern Division of the Cooper Ornithological Club at the Los Angeles Museum, April, 1929; 16 pp., portrait of Lynn Bogue Hunt, and 7 half-tones - - - - - \$ .25  
 An exhibition of scientific drawings by John Livzey Ridgway, shown by the Los Angeles Museum, on the occasion of the Fifth Annual Meeting of the Cooper Ornithological Club - - - - - \$ .25  
 Catalogue of an exhibition of original water colors by Major Allan Brooks, shown under the auspices of the Cooper Ornithological Club, Los Angeles Museum, April, 1936 (Eleventh Annual Meeting of the C.O.C.); 15 pp. and 9 half-tones, including one of Major Brooks - - - - - \$ .25

#### Other Publications

- The Story of the Farallones, 1897; 36 pp., 28 ills. \$ .25  
 By C. BARLOW  
 Report of the Birds of Santa Barbara Islands. Pub. No. 1. Pasadena Acad. Sci., August, 1897; 26 pp. - \$1.00  
 By J. GRINNELL  
 Birds of the Pacific Slope of Los Angeles County. Pub. No. 2, Pasadena Acad. Sci., March, 1898; 52 pp. \$ .50  
 By J. GRINNELL

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